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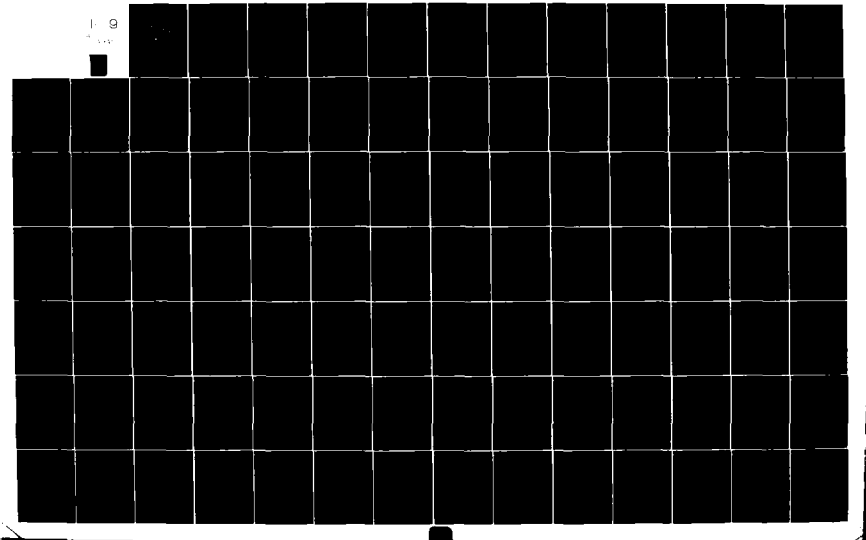

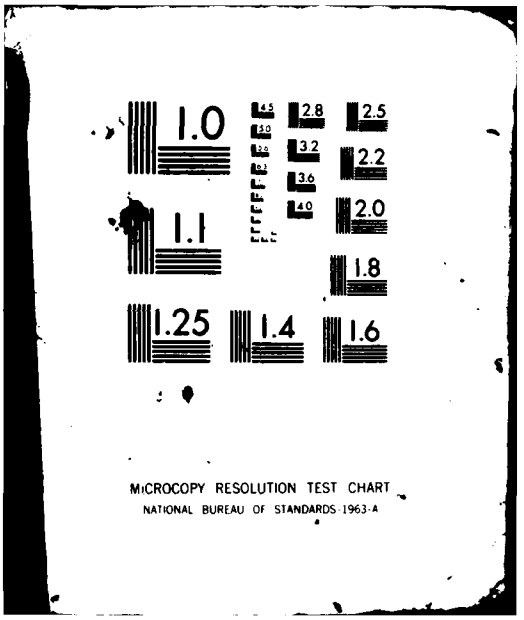
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DEPARTMENT OF THE NAVY
SUPPORTING DATA FOR FISCAL YEAR 1983
BUDGET ESTIMATES DESCRIPTIVE SUMMARIES (U)

SUBMITTED TO CONGRESS FEBRUARY 1982

RESEARCH, DEVELOPMENT, TEST AND EVALUATION,NAVY

BOOK 2 OF 3 BOOKS

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TACTICAL PROGRAMS

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DEPARTMENT OF DEFENSE, MILITARY
RDT&E, NAVY
FY 1983 RDT&E DESCRIPTIVE SUMMARY
February 1982

PREFACE

This is an information document designed for use by Congressional Committees in conjunction with FY 1983 Budget hearings on the Navy Research, Development, Test and Evaluation, Navy Program. This document contains a descriptive summary for each program element within the Navy FY 1983 RDT&E Program and for each program element which was funded in FY 1982 but not funded in FY 1983 due to cancellation or deferral of the program. Also included are descriptive summaries for projects of $5 million or more within an element in FY 1982 and/or FY 1983.

Where applicable, descriptive summaries may also include, in addition to RDT&E funds, related procurement costs and quantities, and funds for the Military Construction program.

Classified pages bear the appropriate security classification. Classified data is bracketed [thus].

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24134N Title: A-6 Squadrons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,624	9,978	4,725	3,014	17,160	45,805
W0975	A-6 All Weather Standoff Attack Control System	7,624	9,978	0	0	0	20,906
W1638	A-6E Weapons Integration	0	0	4,725	3,014	17,160	24,899

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Projects in this element are designed to enhance the offensive all-weather attack capability of the carrier battle group and the survivability of the A-6E. W0975 A-6 All Weather Standoff Attack Control System: Integrates an all-weather standoff targeting capability into the A-6 aircraft weapon system by incorporating Synthetic Aperture Radar modes of operation into the current A-6E weapon system radar. W1638 A-6E Weapons Integration: Provides for development associated with integration of a variety of standoff weapons (e.g., HARM, Air-to-Surface Weapon) into the A-6 aircraft, including development of an integrated missile panel for common control compatible with all projected missiles.

(U) BASIS FOR FY 1983 RDT&E REQUEST: W0975 A-6 All Weather Standoff Attack Control Systems: Program was terminated for affordability reasons, although requirement for an all weather standoff attack and targeting system remains. W1638 A-6E Weapons Integration: Continue integration of HARM missile started under P.E. 64360N. Perform aerostructural tests, continue development of mission computer software and integrated control panel. Conduct initial flight test of A-6E HARM. Commence development of LASER MAVERICK integration. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: A-6E HARPOON: Development completed with initial operational capability achieved in FY 1981. A-6 All Weather Standoff Attack Control Systems: FY 81 was reduced by $88 due to Navy application of general reduction for inflation. FY 82 reduced by $147 for same reason. Program is terminated after FY 1982 because of program affordability within budget constraints, resulting in a decrease of $125,008 from FY 1983 and subsequent years. A-6E Weapons Integration: Starts in FY 1983 with a total estimated cost of $24,899. The net program decrease is $102,418, due primarily to the termination of the All Weather Standoff Attack Control System.

Program Element: 24134N Title: A-6 Squadrons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENTS	5,378	7,712	10,125	22,393	102,615	148,223
W0443	A-6E HARPOON	3,137	0	0	0	0	3,137
W0975	A-6 All Weather Standoff Attack Control System	2,241	7,712	10,125	22,393	102,615	145,086

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 24134N Title: A-6 Squadrons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Demonstrated tactical deployment of enemy forces during hours of darkness and periods of limited visibility provides a challenge of new dimension to the free world's lines of communication and our ability to thwart aggressive actions initiated by the enemy, at a time and location of his choosing. In addition, the rapidly expanding highly mobile enemy terminal surface-to-air defense systems dictate the need to deliver weapons from standoff ranges in order to minimize aircraft exposure and attrition. These enemy accomplishments have generated the need to improve the Navy's all-weather attack aircraft capability. The project being pursued under this program element provides necessary improvements to aircraft weapon systems so that threats can be countered, without unacceptable loss rates, in any environmental condition. W0975 A-6 All Weather Standoff Attack Control Systems: Not applicable. W1638 A-6E Weapons Integration: Its large weapons capacity and long range made the A-6E a prime vehicle for carriage and launch of the Navy's new air-to-surface weapons (e.g. HARM, MAVERICK series, advanced air-to-surface weapon). Integration of these new weapons into the A-6E requires development and test of onboard avionics hardware and compatible software for A-6 weapons functions. An integrated control panel will be developed to provide missile control inputs compatible with all projected weapons.

(U) RELATED ACTIVITIES: W0975 A-6 All Weather Standoff Attack Control System: Not applicable. W1638 A-6E Weapons Integration: High Speed Anti-Radiation Missile, Medium range Air-to-Surface Missile, HARPOON Improvement Program, MAVERICK Missile.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA. Contractors: Grumman Aerospace Corporation, Bethpage, NY; Texas Instruments Incorporated, Dallas, TX; other contractors to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0975: A-6 All Weather Standoff Attack Control Systems: Project initiated in FY 1979. Funds utilized to collect and evaluate/analyze high resolution Synthetic Aperture Radar data to commence preparation of required program documentation to support DoD weapon system acquisition process. Demonstration and Validation Phase of high resolution Synthetic Aperture Radar capability for attack aircraft targeting and ship classification successfully completed. System specifications developed.

2. (U) FY 1982 Program: W0975 A-6 All Weather Standoff Attack Control Systems: Program terminated prior to Full Scale Development for affordability considerations. W1638 A-6E Weapons Integration: Commence integration development of HARM missile with A-6E aircraft under P.E. 64360N, initiating avionics and software design. Commence development of integrated missile control panel.

Program Element: 24134N Title: A-6 Squadrons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: W0975 A-6E All Weather Standoff Attack Control Systems: Not applicable. W1638 A-6E Weapons Integration: Perform HARM aerostructural tests, continue development of mission computer software and integrated control panel started under P.E. 64360N. Conduct initial flight test of A-6E HARM. Commence development of A-6E LASER MAVERCK integration.

4. (U) FY 1984 Planned Program: W0975 A-6 All Weather Standoff Attack Control Systems: Not applicable. W1638 A-6E Weapons Integration. Continue mission computer software development, and conduct the Navy Technical Evaluation and the Operational Evaluation of the A-6E HARM integration. Complete the A-6E LASER MAVERICK integration testing. Commence aerostructural testing and software development for integration of Imaging Infrared MAVERICK. Commence integration development for follow-on air-to-surface standoff weapons.

5. (U) Program to Completion: W0975 A-6E All Weather Standoff Attack Control Systems: Not applicable. W1638 A-6E Weapons Integration: Complete operational testing of A-6E HARM. Complete development and testing of A-6E Imaging Infrared MAVERICK integration. Continue integration development and testing of the Navy's follow-on standoff weapons with the A-6 aircraft. Conduct revalidation testing of weapons integration for software/hardware configuration baseline (HARPOON, HARM, MAVERICK, etc.).

6. (U) Milestones:

Milestones (A-6E Weapons Integration)	Date
a. HARM Integration/Operation Test and Evaluation complete	Dec 82/Mar 84
b. LASER MAVERICK Integration/Operational Test and Evaluation complete	Apr 83/Jan 84
c. IIR MAVERICK Integration/Operational Test and Evaluation complete	Apr 84/Jan 85

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24152N
Title: Early Warning Aircraft Squadrons
DoD Mission Area: 353 - Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	18,756	18,925	52,291	47,008	Continuing	Continuing
W0463	Airborne Early Warning Carrier Based Aircraft E-2C Quantity	16,826	16,925	40,649	36,831	Continuing	Continuing
R1571	Special Evaluations/Techniques	1,930	2,000	11,642	10,177	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Project W0463 funds development planning for the modification/replacement of selected avionic weapon replaceable assemblies of currently installed subsystems of the E2C. These modifications will enable the E2C to operate in the presence of electronic countermeasures, to more completely exploit threat RF emissions, and to detect raid elements at further range. These expanded capabilities will permit offensive weapons systems to be more effective in countering the tactical threat. Project R1571 is of a higher classification.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue test and evaluation of prototype weapon replaceable assemblies and software associated with the High Speed Processor, and initiate design of expanded radar detection and electronic countermeasures capabilities. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT DESCRIPTION SUMMARIES: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary for Project W0463 reflect decreases of 2,510 in FY 1981 and 2,283 in FY 1982 as a result of refinement of cost estimates and for variations in inflation indices, and an increase of 24,366 in FY 1983 to include radar detection range and electronic countermeasures improvements within the existing update program. This Program Element depicts a continuing program, which is anticipated to require additional outyear funding. Efforts under Project R1571, Special Evaluations/Techniques were started in FY 1981.

Program Element: 24152N
DoD Mission Area: 353 - Naval Warfare

Title: Early Warning Aircraft Squadrons
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,087	19,336	19,208	16,283	Continuing	Continuing
WO463	Airborne Early Warning	11,087	19,336	19,208	16,283	Continuing	Continuing
	Carrier Based Aircraft E-2C						
	Quantity (Total Units of 3 avionics Improvements)						18

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 24152N
DoD Mission Area: 353 - Naval Warfare

Title: Early Warning Aircraft Squadrons
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The E-2C is an all weather, carrier-based airborne early warning aircraft, with a crew of five. This weapon system extends the task force defense perimeter by providing early warning of approaching enemy units (surface and air), vectoring of interceptors into attack position, and providing air and surface situation data to other fleet elements. In addition, the E2C provides strike and traffic control, search and rescue control, communications relay, and automatic tactical data exchange. The E2C is projected to be a viable fleet unit through 2000. Based on analysis of projected ECM and target threat to U.S. Sea Control Forces, R&D program commenced in FY 1979 to provide (1) low sidelobe antenna (TRAC-A) for APS-125 radar subsystems, (2) High Speed Processor (HSP) for the OL-77/ASQ Central Computer Programmer, (3) signal processing extension for the ALR-73 Passive Detection System (PDS), (4) APS-125 radar modifications to optimize surface and airborne target detection and (5) new software tactical program to fully integrate hardware improvements. RDT&E units are being procured for integration, qualification and reliability testing during Development Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E) of the applicable weapon replaceable assemblies (WRA) and software.

(U) RELATED ACTIVITIES: Program Element (PE) 62721N, Command and Control Technology for Data Processing Improvements, and PE 62712N, Surface/Aerospace Target, over-the-horizon targeting surveillance for Radar and Passive Detection System improvements.

(U) WORK PERFORMED BY: In-House: Naval Air Test Center, Patuxent, Md, Naval Research Laboratory, Washington, D.C., Fleet Combat Direction System Support Activity, San Diego, Calif. Contractors: Grumman Aerospace Corporation, Bethpage, New York.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Full scale production of the E2C was authorized by the Secretary of Defense on 24 June 1971 and the Weapon System has been operational since February 1974. Approval for service use for the E2C and its installed subsystems was granted by the Chief of Naval Operations in June 1974. During FY 1981, a full scale engineering model of the Trac-A antenna was delivered and initial testing completed. The High Speed Processor component development proceeded to the fabrication stage, and the weapon replaceable assembly design has proceeded through the conceptual design phase.

2. (U) FY 1982 Program: Complete full scale development test and evaluation of the Trac-A antenna group. Construct engineering development models of the High Speed Processor (HSP) weapon replaceable assemblies and begin development test and evaluation. Commence modification of various radar weapon replaceable assemblies and design integration software to permit airborne development test and evaluation of the High Speed Processor expanded track capacity and improved surface surveillance (Group I functions).

3. (U) FY 1983 Planned Program: Complete development and operational test and evaluation of Group I for a preliminary approval for service use. Commence design of tactical program software and development of engineering development models of extended range, environmental processing and expanded radar electronic countermeasures capabilities (Group II functions).

Program Element: 24152N
DoD Mission Area: 353 - Naval Warfare

Title: Early Warning Aircraft Squadrons
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue design of Group II weapon replaceable assemblies. Commence contruction of final software associated with Group I hardware.

5. (U) Program to Completion: Complete weapon system integration and conduct development and operational test and evaluation for applicable weapon replaceable assemblies.

6. (U) Milestones:

Milestones		Date
a.	Project Initiated (Letter Contract)	Jun 1968
b.	Defense Systems Acquisition Review Councit (DSARC III)	Jun 1971
c.	Production Contract awarded	Sep 1971
d.	Board of Inspection and Survey Trials completed	Nov 1973
e.	E-2C Fleet Operational Capability	Feb 1974
f.	AN/APS-125 Radar Operational Capability	May 1978
g.	Pilot production of Trac-A antenna delivered	Jun 1983
h.	Group I - Navy Preliminary Evaluation (NPE)	*Sep 1983
i.	Group II - Navy Preliminary Evaluation (NPE)	*Sep 1985
j.	Group I and Group II Operational Evaluation	*Sep 1988

* New milestone as result of program expansion in FY 1983 and beyond.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24161N
Title: Aviation Support Carrier Air Wing
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENTS	2,384	7,957	7,968	1,911	Continuing	Continuing
W0431	Tactical Aircrew Combat Training System	1,924	1,942	*	*	*	*
W1414	Integrated Air Warfare Training Complex - Fallon	460	6,015	*	*	*	*
W1633	Aerial Refueling Store	0	0	7,968	1,911	2,167	12,046

* For FY 83 and subsequent years W0431 and W1414 are to be reported under Program Element 24571N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Further development of the Tactical Aircrew Combat Training System (formerly Air Combat Maneuvering Range) is required to extend the current superior training capability in air-to-air combat to other phases of air warfare, e.g., air-to-surface and defense suppression; to provide comprehensive interface with additional tactical aircraft; and to include realistic electronic warfare simulation in all training exercises. A complementary development employing the same technology will be initiated in FY 1982 to provide a modern instrumented range at NAS Fallon, NV for graduate training of Navy and Marine Corps Squadrons ranging from single aircrews to full carrier air wing exercises. This project has been identified by the Tactical Air Commanders as their highest priority training range requirement. The capabilities of current aerial refueling stores are inadequate to meet current or projected aerial refueling requirements for carrier tactical aircraft. This shortfall has been highlighted by recent blue water operations and will further increase with the introduction of the F/A-18 aircraft in the fleet.

(U) BASIS FOR FY 1983 RDT&E REQUEST: There is no FY 1983 effort under program element 24161N for projects W0431 and W1414. These projects are being reported under PE 24571N in FY 1983. The FY 1983 effort in the Aerial Refueling Store Project includes the initiation of design and development of aerial refueling stores. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary results primarily from the decision to relocate projects W0431 and W1414 to Program Element 24571N beginning in FY 1983. Project W1633 is a new start in FY 1983. Contractors are to be competitively solicited and selected for the design, development and testing of the aerial refueling store and a Test and Evaluation Master Plan will be formulated for Chief of Naval Operations approval. FY 1981 increased 537 overall with an increase

of 77 in WO431 and 460 in W1414. Internal reprogrammings minus inflation and travel reduction account for increase. FY 1982 decreased 7,680 overall with a decrease of 46 in WO431 due to inflation and travel reduction and a decrease in W1414 of 7,634 due to funding realignments during the budget process.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENTS	2,342	1,847	15,637	5,080	Continuing	Continuing
WO431	Tactical Aircrew Combat Training System	2,342	1,847	1,988	2,174	Continuing	Continuing
W1414	Integrated Air Warfare Training Complex - Fallon	0	0	13,649	2,906	961	17,516

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	1,556	760	0	0	Continuing	Continuing
APN	1,470	3,137	0	0	Continuing	Continuing
Quantity**	0	14	0	0	Continuing	Continuing

** Quantities shown are for aircraft instrumentation subsystems procured with APN for the Tactical Aircrew Combat Training System.

Program Element: 24161N
Title: Aviation Support Carrier Air Wing
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Given the capabilities of modern sophisticated weapon systems and the probability of relatively equal capabilities of threat systems, the outcome of any future conflict will probably be determined by the relative proficiency of the weapon system operators. During the conflict in Southeast Asia, the Navy recognized a need to improve the training of aircraft operating crews in order to increase their relative proficiency in air combat maneuvering. For this purpose the Tactical Aircrew Combat Training System (formerly Air Combat Maneuvering Range) was developed. The current fixed shorebased Tactical Aircrew Combat Training Systems covers an area on the ground and overhead airspace approximately 30 miles in diameter. They provide precise measurement of aircraft position and motion for up to eight aircraft simultaneously and capability for continuous, instantaneous assessment of aircraft and weapon system performance during the highly dynamic air combat maneuvering situation. Aircraft engaged in free "dog-fights" are tracked by multilateration techniques. Tracking data and aircraft performance data transmitted from an instrumentation pod on each aircraft are inserted into the computation and control subsystem and monitored by a Range Training Officer who provides instructional and safety of flight directions to the aircrews through voice radio link. All data is recorded for subsequent debrief replay to permit the aircrews involved to evaluate their performance. Experience with the two operational Tactical Aircrew Combat Training Systems indicates they provide superior training in air-to-air warfare and have an inherent potential for extension to improved training in air-to-ground, defense suppression and Electronic Warfare tactics. These two development projects will exploit this potential. In the Tactical Aircrew Combat Training System project the system developments include (1) development and test of an F/A-18 internal aircraft instrumentation subsystem to make the Tactical Aircrew Combat Training System interface with the weapon system data bus thereby increasing significantly the scope and quality of the training available to aircrews flying these aircraft; (2) development and test of interface devices to provide a capability for the Tactical Aircrew Combat Training System to present realistic simulation of Electronic Warfare signal effects on airborne radar warning receiver cockpit displays and to evaluate aircrew responses to these presentations thereby increasing both the realism of the training scenario and the evaluation of aircrew performance; (3) development and implementation of simulation models for additional air-to-air and air-to-ground weapon systems to increase the scope of training available, and (4) development and test of interface devices to permit transmission of aircraft and weapon system data from additional aircraft. The objective of the Integrated Air Warfare Training Complex project is to develop a modern instrumented arena in the military operations areas near Fallon, NV, to provide essential training for Tactical Air units. The Integrated Air Warfare Training Complex will integrate existing and planned range instrumentation and air traffic control systems with state vector tracking, computation, control, and display subsystems to provide for conduct of realistic multiple simultaneous air-to-air, air-to-ground and defense suppression engagements for up to fifty aircraft. Proj W1633: Existing Douglas D704 and Sargent Fletcher Model 31-300 Aerial Refueling Stores are marginally capable of satisfying current operational demands due to poor maintainability and reliability. These units, procured in the late 1950s and early 1960s, are nearing the completion of a useful service life as reflected in their inordinately low asset availability (50 to 70% non-ready for issue), high spare and repair parts demand and exceptional maintenance manhours per flight hour. Poor inflight reliability has resulted in an increasing incidence of stores attrition, thereby creating a shortfall in total assets which is rapidly becoming critical. The design of these stores, representing 30-year old technology, incorporates pyrotechnic components which are increasingly subject to failure with an attendant danger of fire or inflight explosion. The net effect of these problems is a reduced and declining stores readiness,

Program Element: 24161N
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concurrent with increasing requirements for stores capability to support operational commitments such as the current Indian Ocean presence; to respond to more capable threat systems such as the Soviet Backfire; and to meet the operational needs of future high performance aircraft. Aerial refueling extends the range and/or endurance of tactical aircraft for operational missions and provides a required margin of safety in day, night and adverse weather carrier operations by ensuring readily available fuel when needed. The existing state of stores readiness provides only marginal capability, will not meet projected needs, and creates a potential for tactical aircraft losses which may otherwise be avoided had fuel been available. The most practical solution to this problem is the development and deployment of a new stores as soon as possible employing current technology. The new store will be employed on carrier-deployed combat aircraft to supplement the refueling capability of dedicated tankers. Aircraft configured with the store will be capable of refueling all carrier-based tactical aircraft. They will be used to provide fuel on demand for normal carrier launch and recovery evolutions, either as airborne refuelers for cyclic operations or on deck alert for unplanned contingencies.

(U) RELATED ACTIVITIES: The first Tactical Aircrew Combat Training System developed as an Air Combat Maneuvering Range in the period FY 1970 through 1974, is now operational at Yuma, AZ. A second system has been installed on the East Coast off Cape Hatteras. Similar systems have been procured by the Navy for the USAF and installed at Nellis AFB, NV, Tyndall AFB, FL, and in the Mediterranean. Additional USAF systems are being procured for installation in the Western Pacific, and at Luke AFB, AZ, and Holloman AFB, NM. At Fallon, NV the existing range instrumentation systems with which the Integrated Air Warfare Training Complex will interface, include the Device 2D2 Electronic Warfare Training Range, Weapon Impact Scoring Systems, Mobile Land Targets and associated control equipment, and strafe scoring systems. All of these have been acquired with procurement funding in a variety of P-1 line items. Proj W1633: Ongoing efforts in the aerial refueling area include KC-10A and KC-135 update programs. Each of these aircraft plan the incorporation of a hose reel assembly to facilitate aerial refueling of probe equipped receiver aircraft. These efforts are the following: NAVY AIRCRAFT INTEROPERABILITY WITH THE KC-10A, Aircraft Flight Test General Program, Program Element 25663N and NAVY EVALUATION OF KC-135 PROTOTYPE HOSE AND DROGUE ARS, Aircraft Flight Test General Program, Program Element 25663N. The technology for the new aerial refueling store will draw from these ongoing efforts. A concurrent improvement program for the D-704 and 31-300 refueling stores is being developed with FY 1983 funds by the Naval Air Development Center. This program will provide for reliability and maintainability improvements to extend the life of the present store and will help sustain the inventory level until the new store enters the fleet.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Fleet Analysis Center, Corona, CA; Naval Air Test Center, NAS Patuxent River, MD; Air Test and Evaluation Squadron Four (VX-4), Point Mugu, CA; Air Test and Evaluation Squadron Five (VX-5), China Lake, CA. Contractor: Cubic Corporation, San Diego, CA; SRI International, Menlo Park, CA, Systems Engineering Technology Associates Corporation, Newport Beach, CA. Proj W1633: In-House: Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; Naval Air Test Center, Patuxent River, MD Air Test and Evaluation Squadron Five, China Lake, CA. Contractor: Unknown (Competitive Procurement planned).

Program Element: 24161N
DoD Mission Area: 235 - Naval Warfare Support

Title: Aviation Support Carrier Air Wing
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The initial Air Combat Maneuvering Range development was completed and the first system became operational in December 1974. Since 1977 two Tactical Aircrew Combat Training Systems have been operational and system improvements (funded with procurement appropriations) have eliminated early system shortcomings resulting in a recommendation for "Approval for Service Use". Recent development effort has provided a demonstration of the feasibility of designing a system capable of deploying with a carrier task force. FY 1981 effort has focused on extending the system to F/A-18 training and providing Electronic Warfare capability. Definition of design requirements for F/A-18 interface with the Tactical Aircrew Combat Training System has been completed and a development contract awarded for the design and fabrication of an internal aircraft instrumentation subsystem. Laboratory demonstration of the Tactical Aircrew Combat Training System Electronic Warfare simulation using the ALR-45F radar warning receiver has also been completed. Specifications and interface control documents have been prepared to apply this training system technology to the Integrated Air Warfare Training Complex development. Proj W1633: Not applicable. FY 1983 new start.

2. (U) FY 1982 Program: A flight test demonstration of the electronic warfare, radar warning receiver interface will be conducted. Final fabrication of development units and development testing of the F/A-18 internal aircraft instrumentation subsystem for Tactical Aircrew Combat Training System will be conducted. The contract will be initiated for the Fallon, Nevada system. Proj W1633: Not applicable. FY 1983 new start.

3. (U) FY 1983 Planned Program: Development of the F/A-18 internal aircraft instrumentation subsystem; beginning in FY 1983 and subsequent years WO431 and W1414 will be reported under Program Element 24571N; Project W1633: Award contract. Initiate design, development and fabrication of new stores. Conduct component development tests.

4. (U) FY 1984 Planned Program: Projects WO431 and W1414 continue under Program Element 24571N. Project W1633: Establish system test plan. Manufacture tooling and fabrication of prototype stores. Complete all contractor ground, functional, performance, development, reliability, maintainability and safety testing.

5. (U) Program to Completion: The Tactical Aircrew Combat Training System project will be a continuing program under Program Element 24571N to develop additional simulations of new or increased performance weapon systems and appropriate aircraft interfaces and to expand the Electronic Warfare simulation capability to include all significant systems in current and new developed combat aircraft. This continuing development is essential to maintain the superior training capability derived from the existing systems. The Integrated Air Warfare Training Project development effort will be completed in fiscal year 1984 with the conduc of development testing and Operational Test and Evaluation of the basic system. Project W1633: Complete Navy Preliminary Evaluation, Technical Evaluation, and Operational Evaluation. Obtain Approval for Service Use. Contract for production units.

6. (U) Milestones:

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24163N
Title: Fleet Telecommunications (Tactical)
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	15,381	34,282	21,140	33,956	26,724	163,871
W0661	Combination Radio	2,314	7,134	3,137	914	507	21,746
X0695	High Frequency Improvement	7,684	9,631	9,158	8,242	9,427	57,694
X0725	Communication Automation	3,044	2,844	5,196	1,798	2,813	26,998
X1321	Ultra High Frequency Radio Channel Conversion	25	0	0	0	739	764
X1511	Teleprinter Replacement Program	0	0	451	297	0	748
X1564	Near-term Anti-Jam Communications	2,314	14,673	3,198	22,705	13,031	55,921

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element is comprised of projects which support evolutionary development of Navy fleet telecommunications. Additionally, it will provide replacement state-of-the-art equipments to maintain Fleet readiness.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The VHF/UHF Combination Radio (AN/ARC-182) (Project W0661) radio/antenna production deliveries will continue. Full scale engineering development of jam resistant devices (appliques) will be initiated. The High Frequency Improvement (Project X0695) digital modem will enter full scale engineering development. Complete high frequency receiver and exciter advanced development models, and initiate testing. Wide band high frequency anti-jam/concept validation modem models testing will be completed. Communications Automation (Project X0725) will continue development of the Navy modular automated communications systems family of equipment, which provides a modular shipboard message processing system to meet the requirements of the various hull types. Teleprinter Replacement Program (Project X1511) will lead to the procurement of modernized teleprinter equipment for the replacement of current equipment. Government test and evaluation of the candidate teleprinter equipment leadng to service approval will commence. Near-term Anti-Jam Communications (Project X1564) will complete system installation on one Battle Group, evaluate the system during technical evaluation/operational evaluation and make necessary design changes. The decreased funding of 473 thousand in High Frequency Improvement (Project X0695) is due to the completion of development for the Selective Antenna Coupler Group. The increased funding of 2,352 thousand in Communications Automation (Project X0725) is due to full scale development of Navy Modular Automated Communications System V(5). Decreased funding in Near-Term Anti-Jam Communications (Project X1564) of 11,475 thousand is due to the completion of testing and installation in one Battle Group. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 24163N
DoD Mission Area: 345 - Tactical Communications

Title: Fleet Telecommunications (Tactical)
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile as shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are: (a) Communications Automation (Project X0725) funding in FY 1981 increased 271 to accomplish unfunded requirements. (b) Ultra High Frequency Radio Channel Conversion (Project X1321) funding decreased 739 in FY 1981 as a result of transferring of funds for the procurement of modification kits. (c) Teleprinter Replacement Program (Project X1511) funding increased 451 in FY 1983 due to commencement of test and evaluation. (d) Near-Term Anti-Jam Communications (X1564) funding increased 2,314 in FY 1981 as a reslt of reprogramming to take advantage of low risk technology development which had applications to this project. Other minor changes result from refinement of cost estimates including adjustment for inflation. The FY 1983 funding To Be Determined in the FY 1982 Descriptive Summary is now estimated to be funded at the 21,140 level.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY (AMENDED):

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimte	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	14,213	13,574	35,060	TBD	TBD	TBD
W0661	Combination Radio	1,858	2,353	7,334	TBD	TBD	TBD
X0695	High Frequency Improvement	6,440	7,684	9,931	TBD	TBD	TBD
X0720	Advanced Communications Control System	3,081	0	0	TBD	TBD	TBD
X0725	Communication Automation	2,834	2,773	2,894	TBD	TBD	TBD
X1321	Ultra High Frequency Radio Channel Conversion	0	764	0	TBD	TBD	TBD
X1564	Near-Term Anti-Jam Communications	0	0	14,901	TBD	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN (Note 1)	8,100	11,500	15,900	TBD	TBD	TBD
Quantity						TBD
OPN (Note 2)						
33 - 3011 (HFIP)	11,997	13,955	14,232	19,210	116,022	175,416
33 - 3012 (UHF)	8,039	24,730	30,855	29,262	83,267	176,153
33 - 3146 (VLF)	0	0	0	0	11,430	11,430
33 - 3040 (IMPROVEMENT)	6,123	3,854	7,170	7,728	21,049	45,924

Program Element: 24163N
DoD Mission Area: 345 - Tactical Communications

Title: Fleet Telecommunications (Tactical)
Budget Activity: 4 - Tactical Programs

Note 1 - Procurement of Combination Radio (AN/ARC-182) Spread over numerous APN line items.
Note 2 - Planned procurement of Navy Modular Automated Communications Systems.

Program Element: 24163N
DoD Mission Area: 345 - Tactical Communications

Title: Fleet Telecommunications (Tactical)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Combination Radio and associated antenna are in full scale engineering development and will provide tactical aircraft with a small, secure combination radio system. High Frequency Improvements will provide newly designed, modularized, standardized high frequency equipments, characterized by: automatic and remote control high speed digital data handling, anti-jam and low probability of intercept capability and improved availability. Systems engineering tasks will define interfaces, interoperability and netting, and derive development efforts for all tasks. The Communication Automation project will provide a family of modular, reliable, machine-aided message processing systems tailored to the requirements of various hull types. Capabilities will be provided for machine-aided screening, preparation, distribution, reproduction, storage, and retrieval of record message traffic. The Near-Term Anti-Jam Communications project will provide the capability for secure anti-jam voice (FY 1982/FY 1983) The Navy planned AN/ARC-182 combination radio and AN/WSC-3 line-of-sight radio systems will provide the base for application of technology developments.

(U) RELATED ACTIVITIES: The projects within this element are complementary to most Navy communications development or improvement efforts and to joint service efforts such as Tri-Service Joint Tactical Communications Program (Program Element 28010N) and Joint Tactical Information Distribution System, (Program Element 25640N); the Army SINCGARS-V and the Air Force "HAVE QUICK" activities.

(U) WORK PERFORMED BY: In House: Naval Electronic Systems Command, Washington, DC; Naval Electronics Systems Engineering Centers, Portsmouth, VA and Charleston, SC; Naval Air Systems Command, Washington, DC; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Avionics Center, Indianapolis, IN; Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Electronic Systems Engineering Activity, St. Inigoes, MD; Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractors: Magnavox, Philadelphia, PA; SRI, San Francisco, CA; Litton Data Systems, Van Nuys, CA; Xetron, Inc., Cincinnatti, OH; Grumman Aerospace Corp., Bethpage, Long Island, NY; Rockwell International Corp., Collins Telecommunications Products Division, Cedar Rapids, IA; ECI, E-Systems Division, St. Petersburg, FL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Combination radio completed final preparation to enter operational evaluation. Began Awarded contract for the High Frequency Digital Modem Advanced Development Phase. The wideband high frequency anti-jam system continued concept validation phase. Awarded contracts for Advanced Development model receiver and exciter. Awarded contract for the Selective Antenna Coupler Group full scale development. Full Scale Development of Advanced Communications Control System Switching Subsystem was delayed. Commenced development of the Navy HAVE QUICK System using WSC-3 and AN/ARC-182 radios. Navy Modular Automated Communications System V(1), V(2), and V(3) implemented into the Fleet.

2. (U) FY 1982 Program: Combination radio will be operationally tested and subsequently approved for service use. Advanced models Completed advanced development testing for the High Frequency Digital Modem. Continue development of the advanced development models of new receivers and exciters. Continue selective Antenna Coupler Group

full scale development. Complete development of the small ship version Navy Modular Automated Communications System. Initiate technical/operational evaluation of these systems. Contractor tests and government testing and system integration/installation (F-14, E-2C, ships) will be initiated for near-term anti-jam communications. Commence experimental deployment in the Fleet. The design, development, hardware procurement, platform integration and system installation will take place.

3. (U) FY 1983 Planned Program: Commence full scale production of the combination radio and broad band antenna. Full scale development will commence. Begin full scale development for High Frequency Digital Modem. Continue full scale development of receiver and exciter. Begin test and evaluation of the Selective Antenna Coupler Group and high frequency power amplifier. Establish design objectives for the wideband radio frequency distribution system equipments. Phase I (voice) of the anti-jam communications project will complete system installation on one Battle Group and will undergo operational/technical evaluation. Technical and operational testing and evaluation of Navy Modular Automated Communications System V(5) will continue.

4. (U) FY 1984 Planned Program: Continue production of the combination radio and broad band antenna. Deliver full scale development models . The Selective Antenna Coupler Group will be Approved for Service Use. The High Frequency system will be Approved for Service Use in FY 1986. Technical and operational evaluation will continue. Phase I (voice) of the anti-jam communications project will be installed in more Battle Groups. Development of the Advanced Models of Phase II will be initiated (pending the approval of the Chief of Naval Operations). Complete Navy Modular Automated Communications System V(5) development. Obtain approval for service use, initiate procurement, and implement the Navy Modular Automated Communications System V(5) into the Fleet. Develop peripheral equipments for improved automated communications.

5. (U) Program to Completion: Complete production of the Combination Radio and broad band antenna. Complete government testing and start production. Complete development of the wide band single channel and wide band multiple channel anti-jam capability to obtain service approval of the ultimate Navy Modular Automated Communications Systems. Continue evaluation of communications system improvements. If approved by the Chief of Naval Operations, complete government testing of Phase II of the anti-jam communications project and start production.

6. (U) Milestones: Not applicable.

Project: W0661 Title: Combination Radio
Program Element: 24163N Title: Fleet Tactical Communications (Tactical)
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The AN/ARC-182 Combination Radio provides tactical aircraft with low power and high power VHF-AM, VHF-FM, UHF-AM, and UHF-FM voice radios, aircraft frequency hopping filters and broadband aircraft antennas. to be developed using the Air Force HAVE QUICK technology and Army's SINCGARS technology.

(U) RELATED ACTIVITIES: Air Force proceeded to production HAVE QUICK in FY 1980. Army continuing development of SINCGARS-V for FY 1985 production decision. Deputy Under Secretary of Defense (Command, Control, Communications, and Inteligence) to review all service jam resistant programs scheduled early FY 1982. Navy proposing combined system as follow-on to HAVE QUICK capability.

(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 Surface Weapons Center, Dalhgren, VA; Electromagnetic Compatibility Center, Annapolis, MD; Contractors: Rockwell-Collins, Cedar Rapids, IA; MITRE, McLean, VA; Magnovox, Fort Wayne, IN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Conducted development and test on low power radios and broadband aircraft antennas. Conducted Technical Evaluation at Naval Avionics Center, Naval Air Development Center, Naval Surface Weapons Center and Naval Air Test Center. Prepared for Operational Evaluation. Limited Contractor Furnished Equipment production started FY 1980 for F/A-18 and HH-65A new production aircraft. Supplied radios for AV-8B aircraft development.

2. (U) FY 1982 Program: Low Power radios and broadband aircraft antennas complete development and obtain Approval for Service Use. High power radio and aircraft frequency hopping filter begin development in FY 1982 to meet HAVE QUICK Rapid Deployment Capability equipment requirements and deployment schedules. SINCGARS-V

3. (U) FY 1983 Planned Program: First Government Furnished Equipment production low power radios and broadband antennas. High power radios and frequency hopping filter complete development and obtain approval for service use. Conducted operational evaluation on HAVE QUICK device for approval for service use and production initiation.

4. (U) FY 1984 Planned Program: Combination radio, broadband antenna, frequency hopping filter and HAVE QUICK production deliveries continue. Development of combined HAVE QUICK and SINCGARS-S4 will be initiated, including modification of radios for SINCGARS-V compatibility.

Project: W0661 Title: Combination Radio
Program Element: 24163N Title: Fleet Tactical Communications (Tactical)
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: This is a continuing program to complete development and approval for service use of combined HAVE QUICK and SINCGARS-V

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0661	Combination Radio	2,314	7,134	3,137	914	507	21,746

Project: X0695 Title: High Frequency Improvement
Program Element: 24163N Title: Fleet Telecommunications (Tactical)
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Present High Frequency equipments are approaching the end of their useful life. This project will provide new, modularized High Frequency communications equipment for ships, submarines, aircraft and shore applications necessary for more effective use of the High Frequency media, fleet modernization, new construction and shore facilities. It will provide improved availability, automation and remote control, greater equipment efficiency and flexibility, anti-jam and low probability of intercept capabilities for the intra-task force communications, and jam resistant communications for ship to shore. Techniques will include broadband "spread spectrum" modulation techniques for anti-jam and low probability of intercept in addition to conventional narrowband (3KHZ) concepts employing specialized modulation and coding for anti-jam and for normal sustained operations in a benign communications environment. Narrowband anti-jam concepts will include frequency hopping and adaptive antenna null steering or null-on-jam. Design of the radio will consider effectiveness of providing broadband and narrowband operation in one radio through modular interchange. This project implements a two part program of improvements to the Navy's High Frequency communication system. The first part incorporates improvements to the existing conventional High Frequency system with the development and deployment of the Selective Antenna Coupler Group and the High Frequency Digital Modem. The second part will provide anti-jam capability to the Fleet with the addition of a frequency agile exciter and receiver and a wideband power amplifier and wideband radio frequency distribution and antenna system.

(U) RELATED ACTIVITIES: This project compliments and precedes other Navy communications high frequency development or improvement efforts both ashore and afloat.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, D.C.; Naval Electronics System Engineering Activity, St. Inigoes, MD. Contractors: Magnavox, Philadelphia, PA; GTE Sylvania, Needham Heights, MA; Litton, Van Nuys, CA and College Park, MD; Rockwell International, Cedar Rapids, IA; Harris, Rochester, NY; TRACOR, Rockville, MD, and Booz, Allen and Hamilton, Bethesda, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Testing of the wideband anti-jam Concept Validation Modem commenced FY 1980. Established performance objectives for advanced development anti-jam system. A contract was awarded for the development of the High Frequency Digital Modem. Peformance objectives for the wideband anti-jam power amplifier were established. Investigations of channel evaluation and monitoring techniques were initiated. Three competitive engineering design contracts for the frequency agile receiver and exciter Advanced Development Phase were completed. The contract for the Full Scale Development phase of the Selective Antenna Coupler Group was awarded.

2. (U) FY 1982 Program: Continue Full Scale Development of the Selective Antenna Coupler Group. Complete Advanced Development of the High Frequency Digital Modem. Award contracts for Advanced Development Models of the wideband anti-jam receiver/exciter, the

Project: X0695 Title: High Frequency Improvement
Program Element: 24163N Title: Fleet Telecommunications (Tactical)
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

wideband anti-jam modem, and the anti-jam system controller. Award competitive engineering design contracts for the wideband anti-jam power amplifier.

3. (U) FY 1983 Planned Program: Initiate Full Scale Deveopment of the High Frequency Digital Modem. Continue development of the anti-jam receiver and exciter Advanced Development Models. Award contract for Advanced Development Models of the wideband anti-jam power amplifier. Complete development and begin test and evaluation of the Selective Antenna Coupler Group full scale development models. Establish design objectives for the wideband radio frequency distribution and antenna system. Continue the Advanced Development of the wideband anti-jam modem. Continue Advanced Development of a wideband anti-jam system controller. Decreased funding of 473 thousand is due to the completion of development of the Selective Antenna Coupler Group.

4. (U) FY 1984 Planned Program: Complete Full Scale Development of the Selective Antenna Coupler Group. Continue Full Scale Development of the High Frequency Digital Modem. Complete Advanced Development of the wideband anti-jam receiver/exciter, wideband anti-jam modem, and anti-jam system controller. Complete Advanced Development of the wideband anti-jam power amplifier and the wideband anti-jam radio frequency distribution and antenna system.

5. (U) Program to Completion: Obtain Approval for Service Use and enter into production of the Selective Antenna Coupler Group and High Frequency Digital Modem with an initial operating capability respectively. Complete Advanced and Full Scale Development of the wideband anti-jam system and initiate production with an initial operating capability date of . This is a continuing program which will address additional high frequency improvements as requirements develop.

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0695	High Frequency Improvement	7,684	9,631	9,158	8,242	9,427	57,694

Project: X0725
Program Element: 24163N
DOD Mission Area: 345 - Tactical Communications

Title: Communications Automation
Title: Fleet Telecommunictions (Tactical)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Navy Modular Automated Communications System is a family of machine-aided message processing system tailored to meet requirements of certain hull types. The systems are built around the standard Navy AN/UYK-20 Processor and standard peripheral equipments. The first three members of the family AN/SYQ-7 V(1,2,3) are being installed in the Fleet. The largest system, AN/SYQ-7 V(5) is in development.

(U) RELATED ACTIVITIES: Not applicable. The system interfaces with stand alone message preparation devices.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Engineering Centers, San Diego, CA and Charleston, SC. Contractors: Sperry Rand UNIVAC, St. Paul, MN, and Validity Corporation, Clinton, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In 1974 the Navy Modular Automated Communications System development program began. By 1981 the Navy Modular Automated Communications System V(1), V(2), and V(3) were being implemented in the Fleet.

2. (U) FY 1982 Program: Continue hardware and software development of the Navy Modular Automated Communications System V(5).

3. (U) FY 1983 Planned Program: Technical and operational testing and evaluation of the Navy Modular Automated Communications System V(5). The increased funding of 2,352 thousand is due to full-scale development of the V(5) system.

4. (U) FY 1984 Planned Program: Navy Modular Automated Communications System V(5) development completed. Approval for Service Use, procurement and implementation into Fleet of the Navy Modular Automated Communications System V(5). Development of peripheral equipments for improved automated communications.

5. (U) Program to Completion: Continue development of peripheral equipments for improved automated communications. This is a continuing program.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0725	Communication Automation	3,044	2,844	5,196	1,798	2,813	26,998

Project: X1564 Title: Near-Term Anti-Jam Communications
Program Element: 24163N Title: Fleet Telecommunications (Tactical)
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The program will provide the capability for secure, anti-jam Ultra High Frequency voice (Phase I) (FY 1982/1983) and will be interoperable with the U.S. Air Force Ultra High Frequency anti-jam voice radio (HAVE QUICK). Later development will focus on interoperability with the U.S. Army anti-jam very high frequency radio (SINCGARS). The Navy planned AN/ARC-182 Combination Radio and AN/WSC-3 line-of-sight radio systems provide the base for application of low risk technology developments. The Air Force HAVE QUICK technique will be used as an interface in modification of a limited number of AN/ARC-182 and AN/WSC-3 radios in providing a secure, anti-jam voice capability. An improved anti-jam capability will again utilize the existing line-of-sight radios. The basic approach will expand the planned work to modify the AN/ARC-182 to be Army SINCGARS (very high frequency) compatible , with programmable modes to enable ship and aircraft links to adjust with the tactical situation.

(U) RELATED ACTIVITIES: This project is related to the Army SINCGARS-V and the Air Force HAVE QUICK activities.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD; Naval Electronic Systems Engineering Center, Charleston, SC; Naval Avionics Center, Indianapolis, IN; Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD; and Naval Research Laboratory, Washington, DC. Contractors: Rockwell International Corp., Collins Telecommunications Products Division, Cedar Rapids, IA; Magnavox, Fort Wayne, IN; ECI, E-Systems Division, St. Petersburg, FL; Xetron, Inc., Cincinnatti, OH; Grumman Aerospace Corp., Bethpage, Long Island, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The opportunity for Low Risk Technology development was identified as part of the Navy planned AN/ARC 182 Program (Project W0661). Commenced development of Navy HAVE QUICK system usning WSC-3 and AN/ARC-182 radios (Project X1564).

2. (U) FY 1982 Program: Contractor tests, government tests will be initiated and feasibility demonstrated. Conduct integration and system installation (F-14, E-2C, ships). Commence experimental deployment in the Fleet. The design, development, hardware procurement platform integration and system installation will take place.

3. (U) FY 1983 Planned Program: Complete system installation on one Battle Group. Phase I will undergo operational/technical evaluation. Evaluate system during operational/technical evaluation and make necessary design changes. Decreased funding of 11,475 thousand is due to the completion of testing and installation in one Battle Group.

4. (U) FY 1984 Planned Program: Phase I (voice) will be installed in more Battle Groups. Upon Chief of Naval Operations approval, Phase II will be initiated.

Project: X1564 Title: Near-Term Anti-Jam Communications
Program Element: 24163N Title: Fleet Telecommunications (Tactical)
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Complete government testing of the applique and start production.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X1564	Near-Term Anti-Jam Communications	2,314	14,673	3,198	22,705	13,031	55,921

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24281N
Title: Submarines
DOD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,710	7,429	6,464	9,496	Continuing	Continuing
S0239	AN/BQS-15 Improvement	5,710	6,425	5,723	4,570	3,708	28,696
	(Quantity-Engineering Development Model)		(*)				(1)
S1307	Submarine Transducer Engineering Improvement	0	1,004	741	4,926	Continuing	Continuing

* Development/Operational Test and Evaluation

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: S0239 AN/BQS-15 Improvement - The AN/BQS-15 Improvement Program will provide an improved mine detection and avoidance capability to the SSN 637/688 Classes and future submarines. The improved offensive capability of mines poses a future threat to the submarine forces. The AN/BQS-15 improvement program provides the capability to detect the mines and provide advanced warning so that the submarines can take evasive action and navigate the minefields safely. S1307 Submarine Transducer Engineering Improvement - In FY 1982, engineering development of improved sonar transducers will begin to reduce transducer radiated and self noise and improve transducer and reliability.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0239 AN/BQS-15 Improvement - Continue design and fabrication of at-sea test models for a Mine Detection and Avoidance Sonar for SSN 637 and SSN 688 Class submarines. S1307-AS Submarine Transducer Engineering Improvement - Develop design improvements and specifications for sonar transducers. As project S1307-AS is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: S0239, AN/BQS-15 Improvement - Restructuring and revision of estimates have resulted in annual changes of -52, -290 and -1,619 in the FY 1981, 1982 and 1983 estimates, repectively, and reduction of the total estimated cost of this program by 1,985. S1307, Submarine Transducer Engineering Improvement - The FY 1982 and FY 1983 estimates have decreased by 13 and 21, respectively, due to minor revisions. The annual program element total

estimates have decreased by -52, -303 and -1,640 in FY 1981, 1982 and 1983, respectively, due to the above changes. The other Procurement, Navy and Shipbuilding and Conversion, Navy funding for AN/BQS-15 Improvements shown in the FY 1982 Descriptive Summary is associated with the Submarine Sonar Improvements program (Program Element 64503N, project S0219), as a result of the above restructuring.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,446	5,762	7,732	8,104	Continuing	Continuing
S0239	AN/BQS-15 Improvement	1,446	5,762	6,715	7,342	8,302	30,681
S1307	Submarine Transducer Engineering Improvement	0	0	1,017	762	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable, procurement of mine detection and avoidance sonar components will be part of the Submarine Sonar Improvements program, project S0219 of Program Element 64503N.

Program Element: 24281N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarines
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0239 AN/BQS-15 Improvement: The improved offensive capabilities of recently developed enemy mines pose a serious threat to submarines. The Mine Detection and Avoidance Sonar System improvement provides the capability to detect these mines and provide advanced warning so that SSN 637/688 Class submarines can take evasive action or navigate the mine field safely. The Mine Detection and Avoidance Detection Sonar development is being pursued using hardware elements in common with the Submarine Active Detection Sonar and the AN/BQQ-5. It will be introduced to the fleet as an upgrade, integrated with the AN/BQQ-5, and as part of the Submarine Advanced Combat System. It will replace, rather than improve, the AN/BQS-15. One Engineering Development Model will be provided for development test and evaluation. S1307 Submarine Transducer Engineering Improvement: Determine the full impact of radiated acoustic and electrical self-noise, establish baseline criteria, develop test and certify standards, develop the measurement capability (including facilities) to test to the derived standards, identify noise sources in transducers/hardware and address solutions, establish noise standards at the Naval Research Laboratory, Underwater Sound Reference Division, Orlando, Florida and impact the design/specification of both existing and new fleet transducers.

(U) RELATED ACTIVITIES: Project S0239 - The capabilities of the improved mine detection/avoidance sonar will be incorporated in the AN/BQQ-5 Submarine Sonar Improvements (Program Element 64503N) and Submarine Advanced Combat System (Program Element 64524N). Advanced development of the Submarine Active Detection Sonar is being conducted in Program Element 63504N, project S0223, Submarine Sonar Systems Advanced Development. Project S1307 - Submarine Transducer Engineering Improvements will develop new and improved transducer design technology for numerous existing systems and for current and future sonar development programs.

(U) WORK PERFORMED BY: In-House: S0239 - Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; David Taylor Naval Ship Research and Development Center, Bethesda, MD. S1307 - Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT; David Taylor Naval Ship Research and Development Center, Bethesda, MD. Contractors: S0239 - EG&G, Washington Analytical Service Center, Rockville, MD; TRACOR, Rockville, MD; Applied Research Laboratory, University of Texas, Austin, TX; International Business Machines, Manassas, VA; and Raytheon Company, Portsmouth, RI. S1307 - none.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0239 AN/BQS-15 Improvements - In FY 1979 a study was conducted to verify the feasibility of replacing the existing Continuous Transmission Frequency Modulation technique _ _ and retaining the existing operational parameters with an increased mine detection and avoidance capability. The technique was found to be effective and feasible. The Development Plan of 3 July 1980 was approved 12 March 1981 by the Chief of Naval Operations. Existing contracts to International Business Machines and Raytheon for the Submarine Active Detection Sonar were modified by addition of Mine Detection and Avoidannce Sonar hardware/software requirements. S1307 Submarine Transducer Engineering Improvement - This is an FY 1982 new start.

Program Element: 24281N
Title: Submarines
DOD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: S0239 AN/BQS-15 Improvement: Design, development and test will be accomplished for the Mine Detection and Avoidance Sonar at sea. S1307 Submarine Transducer Engineering Improvment: New start, FY 1982. This program will address the operational requirements and problems for transducers for active and passive sonar surveillance and acoustic communications.

3. (U) FY 1983 Planned Program: S0239 AN/BQS-15 Improvement: Continue fabrication of the Mine Detection and Avoidance Sonar for SSN 637/688 class submarines and complete sea test planning. S1307 Submarine Transducer Engineering Improvement: Generate noise specifications, complete definition of required measurement technology, integration of measurements technology and noise specifications into test and evaluation facility, continue identification of mechanisms and solutions.

4. (U) FY 1984 Planned Program: S0239 AN/BSQ-15 Improvement: Complete fabrication of the Mine Detection and Avoidance Sonar Engineering Development model for the SSN 637/688 class submarine. The at-sea test will be completed and the test data evaluated. S1307-AS Submarine Transducer Engineering Improvements: Implement design solutions in individual transducers; continue test, evaluation and development of design specifications for noise free elements.

5. (U) Program to Completion: S0239 AN/BQS-15 Improvement: The Mine Detection and Avoidance Sonar function will be introduced to the fleet as an improvement to the AN/BQQ-5 and later combat systems. S1307 Submarine Transducer Engineering Improvement: This is a continuing program.

6. (U) Milestones: Not Applicable.

Project: S0239 Title: AN/BQS-15 Improvements
Program Element: 24281N Title: Submarines
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The AN/BQS-15 Improvement Program was initiated in FY 1979 to improve the mine detection and avoidance capability of the SSN 637/688 Class Submarines. The improved offensive capabilities of recently developed enemy mines pose a serious threat to submarines. The AN/BQS-15 improvement program provides the capability to detect these mines and provide advanced warning so that SSN 637/688 classes and future submarines can take evasive action or navigate a mine field safely. The Mine Detection and Avoidance Sonar development is being pursued using hardware elements in common with Submarine Active Detective Sonar and AN/BQQ-5. It will be introduced to the fleet as an upgrade integrated with AN/BQQ-5 and as part of the Submarine Advanced Combat System. This system will be a replacement for, rather than in improvement to, the AN/BQS-15. One Engineering Development Model will be procured to conduct developmental testing and evaluation.

(U) RELATED ACTIVITIES: Advanced development of the Submarine Active Detection Sonar is being conducted in Program Element 63504N, project S0223, Submarine Sonar Systems Advanced Development. The capabilities of the Improved Mine Detection/Avoidance Sonar will be incorporated in the Submarine Advanced Combat System (Program Element 64524N), and in the AN/BQQ-5 Sonar by the Submarine Sonar Improvement Program (Program Element 64503N, project S0219).

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, Newport, RI; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Oceans Systems Center, San Diego, CA. Contractor: Applied Research Laboratory, Austin TX; TRACOR, Rockville, MD; EG&G Washington Analytical Service Center, Rockville, MD; International Business Machines, Manassas, VA; and Raytheon Company, Portsmouth, RI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A study was conducted during FY 1979 and FY 1980 to determine the feasibility of replacing the existing AN/BQS-14 and AN/BQS-15 Continuous Transmission Frequency Modulation sonar technique, and retaining the existing modes and capabilities for under-ice navigation, close contact avoidance and mine detection and avoidance. The technique was determined to be compatible. Mine Detection and Avoidance Sonar development specifications have been incorporated in Submarine Active Detectionn Sonar design and modifications are being fabricated for a sea test system.

2. (U) FY 1982 Program: Fabrication of the Mine Detection and Avoidance Sonar will continue. Planning for at sea testing will begin.

3. (U) FY 1983 Planned Program: Continue monitoring the design/development of the Mine Detection and Avoidance Sonar sea test model. Preparations for Developmental at-sea testing will be completed.

Project: S0239 Title: AN/BQS-15 Improvements
Program Element: 24281N Title: Submarines
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: The at-sea test will be completed and test data evaluated.

5. (U) Program To Completion: The Mine Detection and Avoidance Sonar capability will be incorporated as upgrades to AN/BQQ-5 and as part of the Submarine Advanced Combat System.

6. (U) Milestones: Not Applicable.

7. (U) Resource:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0239	AN/BQS-15 Improvement (Quantity-Engineering Development Model)	5,710	6,425 (*)	5,723	4,570	3,708	28,696 (1)

* Development/Operational Testing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24304N
Title: Mines and Mine Support
DoD Mission Area: 234 - Mine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,393	2,930	1,481	1,123	22,264	54,432
S0268	Mine MK 60 Improvements	6,393	2,930	1,481	1,123	11,754	43,922
S1517	CAPTOR SEASIDE	0	0	0	0	10,510	10,510

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for development of improvements to maintain the MK 60 Mine as a viable deep water anti-submarine warfare weapon system throughout its service life. The enCAPsulated TORpedo design, designated MK 60 Mod 0 Mine, now in production, is essentially ten years old. Improvements involve design changes to counter both the current and future Soviet submarine threat and to improve operational effectiveness.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 funds are required to complete improvements to the previously referred to as the Alternate Detection and Control Unit and for continuing efforts in simulation and conduct of countermeasures evaluator studies. These improvements will result in a MK 60 Mine' The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary consist of the following: Project S0268, Mine MK 60 Improvements - an increase in FY 1981 of 780 for additional in-water tests, a decrease in FY 1982 of 90 as a result of the Navy application of lower inflation indices and an increase in FY 1983 of 173 for additional in-water tests. Project S1517, SEASIDE - A decrease in FY 1983 of 1,710 is the result of deferral of development due to a realignment of overall Navy priorities.

Program Element: 24304N
DoD Mission Area: 234 - Mine Warfare

Title: Mines and Mine Support
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,985	5,613	3,020	3,018	12,223	Continuing
S0268	Mine MK 60 Improvements	3,985	5,613	3,020	1,308	3,423	Continuing
S1517	SEASIDE	0	0	0	1,710	8,800	10,510

(U) OTHER APPROPRIATIONS FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
WPN BA3 (Weapons & Spares)	86,400	123,200	156,200	185,000	525,200	1,360,700
Quantity	(280)	(400)	(500)	(600)	(1,493)	—
O&MN	5,542	9,156	12,191	12,995	TBD	TBD
MILCON	-	-	-	1,300	2,900	8,800

Program Element: 24304N
DoD Mission Area: 234 - Mine Warfare

Title: Mines and Mine Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This Program Element provides for the development of improvements to the MK 60 Mod 0 EnCAPsulated TORpedo Mine, in order to counter the current and projected Soviet submarine threat in support of the Navy's sea control mission. The EnCAPsulated TORpedo is a moored deep water anti-submarine warfare mine which detects, validates and launches a modified MK 46 torpedo against submerged submarines. It can be planted by aircraft, submarines and surface vessels in water depths down to Its detection and control unit will detect and classify submerged submarines transiting within The EnCAPsulated TORpedo augments air, surface and submarine anti-submarine warfare forces in combating modern submarines and eliminates many of the operational deficiencies of older mine systems. Initial operational test and evaluation has been completed. First production commenced in FY 1976 and the fifth production contract was awarded in FY 1981. Follow-on test and evaluation was conducted during FYs 1978 and 1979. These tests revealed areas where additional enCAPsulated TORpedo improvements are required (i.e., improved probability of target detection and validation of shallow transitors and improved countermeasures resistance). Tasks within this project include: (a) incorporating changes to improve the performance of the enCAPsulated TORpedo detection and control unit against (b) incorporating added (c) validation of the countermeasures evaluator to assess enCAPsulated TORpedo performance over a wide variety of environments/operational scenarios; and (d) determination of design and cost of other improvements required as enemy submarine capabilities increase over the 20 year service life of the enCAPsulated TORpedo.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, White Oak, Silver Spring, MD (lead laboratory); Naval Coastal Systems Laboratory, Panama City, FL. Contractors: Goodyear Aerospace Corporation, Akron, OH; Bendix Electrodynamics Corporation, Sylmar, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: During December 1979, an OSD review of the enCAPsulated TORpedo mine program focused upon the limited performance of the enCAPsulated TORpedo mine against In early 1980, the design was improved. Several engineering changes were tested with production MK 60 Mines. In-water tests against submarines in May, June and September 1980 demonstrated significant improvements in performance against The engineering changes are now being implemented into the production baseline with the resultant MK 60 Mod 1 enCAPsulated TORpedo Mine being delivered with the production run.

Program Element: 24304N
DoD Mission Area: 234 - Mine Warfare

Title: Mines and Mine Support
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Tests will be conducted with MK 60 Mod 1 pilot production mines which have been designed to increase performance against Test results will be analyzed and a decision made as to which modificatons should be implemented into the "800 series" production specifications. Upgrade of the enCAPsulated TORpedo computer modeling/simulation capability to reflect most recent data concerning targets and environment. Continue countermeasure studies on the countermeasures evaluator to determine minefield effectiveness and sensitivities of minefield design. Perform cost, schedule and performance tradeoffs to upgrade the MK 60 enCAPsulated TORpedo capability to meet the threat posed in the FY 1985-2000 time frame.

3. (U) FY 1983 Planned Program: Complete tests of modification/improvements to the MK 60 Mod 1 enCAPsulated TORpedo. Incorporate the into the computer simulation system and check out.

4. (U) FY 1984 Planned Program: Conduct environmental/and submarine target studies. Process results and make changes to operational data/doctrine, minefield design and enCAPsulated TORpedo design as required to optimize effectiveness against the projected future threat.

5. (U) Program to Completion: The computer simulation capability, which includes an actual MK 60 Mod 1 enCAPsulated TORpedo detection and control unit hardware, will be exercised in order to assess performance of the MK 60 Mine against current and projected submarine threats. The annual cost of such simulation is estimated at 1,000 to 1,200 per year.

6. (U) Milestones: Not applicable.

7. (U) Resources: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24311N
Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title*	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	51,244	48,598	49,649	68,904	Continuing	Continuing
X0763	Integrated Undersea Surveillance System Design and Assessment	7,874	7,065	12,110	17,297		
X0764	Integrated Undersea Surveillance System Localization and Tracking Development	21,120	22,808	7,901	10,064	Continuing	Continuing
X0765	Underwater Hardware/Installation Systems	4,096	5,021	9,537	14,537	Continuing	Continuing
X0766	Integrated Undersea Surveillance System Detection and Classification System Development	18,154	13,704	20,101	27,066	Continuing	Continuing

*New titles; titles changed for FY 1983

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for development of shore processing and underwater electronic component and cable technology improvements to improve Sound Surveillance System sensitivity and performance.

(U) BASIS FOR FY 1983 RDT&E REQUEST: During FY 1983, the following efforts continue: Performance evaluation, Sound Surveillance System performance assessment, Sound Surveillance System software support, operation of the Integrated Undersea Surveillance Research and Development Test and Integration Facility for Sound Surveillance System Phase 2 Backfit, noise measurement analysis, Naval Facility slaving satellite interface multiplexer development and Naval Ocean Processing Facility Target Data Processor system design specifications and improved display architecture code developments will continue. Revision 8 of the Target Data Processor software will be completed late in the year. Funding fluctuations from FY 1982 to FY 1983 by project are the result of program restructuring along functional lines. The above funding includes out year escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 24311N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Title: Undersea Surveillance Systems
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflect a total program decrease of 7,781 in FY 1981, 10,364 in FY 1982 and 16,654 in FY 1983. These changes are attributed to reallocations of priorities within the various projects within this program element, and overall funding reductions. The effect of the reductions is to extend the development of the

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	46,242	59,025	58,962	66,303	Continuing	Continuing
X0763	*Undersea Surveillance	7,054	8,641	10,066	11,519	Continuing	Continuing
X0764	*Improved Sound Surveillance System Processing	16,718	24,927	23,210	24,367	Continuing	Continuing
X0765	*Surveillance Underwater Improvements	5,387	4,456	9,065	12,700	Continuing	Continuing
X0766	*Applied Sound Surveillance System Technology	17,083	21,001	16,621	17,717	Continuing	Continuing

*Old titles; changed for FY 1983

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional* to Completion	Total Estimated Cost
Procurement (OPN)		106,879	121,199	113,392	133,353	675,084	Continuing
Quantity		(various)					
Military Construction		0	3,611	7,300	4,800	0	15,711
O&M,N		26,900	29,700	33,100	42,800	0	132,500

*Costs through FY 1987

Program Element: 24311N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Title: Undersea Surveillance Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The realization of extended submerged capabilities by Soviet diesel submarines in the late 1940's significantly increased detection difficulties and led to development of the Sound Surveillance System with the initial installation completed in 1954. The system consists of passive hydrophone arrays, implanted on the ocean floor, which receive submarine radiated acoustic signals and transmit such signals by cable to shore terminals for electronic processing, display and manual analysis. The Sound Surveillance System, ' provides signficant detection capabilities against Soviet submarines and it remains the cornerstone of the Navy's Anti-Submarine Warfare effort. Continually changing Soviet submarine threat characteristics necessitate implementation of substantive system improvements to offset performance degradation owing to the operation of quieter targets in an increasing ocean ambient noise environment. Project X0763, Integrated Undersea Surveillance System Design and Assessment - Provides the continuing developmental support of Sound Surveillance System operation with the following specific objectives: Continue software development and software commonality for Sound Surveillance System Backfit Program; continue a two phase program of performance evaluation, array characterization and performance assessment efforts; provide for maintenance of research and development of government furnished equipment installed at sites; provide continuing systems engineering integration related to the overall Undersea Surveillance System program. Project X0764, IUSS Development - Provides development of systems which, with results of ongoing improvement programs, will offset the effects of threat submarine quieting and increased ambient noise. improvements will include new software, new displays, and software enhancements as well as revised operating procedures capabilities. Phase I backfit featured the establishment of system level configuration defined as a System Validation Model. The Phase II backfit effort extends the capability developed under the Phase I effort and will introduce new subsystems to further enhance the capability of the system network at less cost per subsystem. Project X0765, Underwater Hardware/Installation Systems - Provides for the development of underwater electronic component and cable technology improvements which will extend present system capabilities. Project X0766, Integrated Undersea Surveillance System Detection and Classification Systems Development - Development of detection and classification subsystems occur in this project. This includes efforts in improved operator display. The tasks under this project along with those subsystem developments under Project X0764 and the sustaining engineering efforts of X0763 comprise the future shore electronics development of the Sound Surveillance System program. Systems under development in this project include

Program Element: 24311N
Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: This program element supports effort toward the establishment of a fully integrated undersea surveillance system with resultant technology having related applicability to all integrated program subsystems in the following program elements: Program Element 63784N ASW Surveillance; Program Element 63788N Rapidly Deployable Surveillance System; and Program Element 24313N Surveillance Towed Array Sensor System.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (lead laboratory); Naval Research Laboratory, Washington, DC; Naval Electronic System Engineering Activities, St. Inigoes, MD; and Contractors: Bell Telephone Laboratories, Whippany, NJ; TRW Systems, McLean, VA; ENSCO, Springfield, VA; General Electric Co., Syracuse, NY; UNIVAC, St. Paul, MN; Western Electric Co., Greensboro, NC; Computing Devices Company, Ottawa, Canada.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project X0763, Integrated Undersea Surveillance System Design and Assessment - Recent accomplishments include: evaluation and prediction efforts to establish a current system performance baseline for subsequent use in system level configuration testing; development of computer models to provide support to operational commands; Sound Surveillance System software support, initiation of system performance assessment, an Integrated Test Facility; and integration interface. A Training System Exerciser was developed and installed, and is currently being evaluated. Project X0764 Integrated Undersea Surveillance System Development - Proven technology from this project was integrated into the Sound Surveillance System Phase I Backfit development. Operational test and evaluation was conducted on the major subsystems of the Phase I System Validation Model an Advanced Tunable Attribute Display development was initiated to integrate various System Validation Model subsystem interactive display formats and processed data measurement techniques. A development to provide inputs was also initiated. advanced development model development was completed, and the unit was deployed to a field site for developmental testing. are being developed to augment the initial design. Phase II Backfit operational training, procedures standardization and manuals for fleet introduction were initiated. Developments to reduce the number of operational personnel and for evaluations of the Programmable Signal Processor technology as applied to Sound Surveillance System signal processing were also initiated. Phase II Backfit developmental test and evaluation was initiated Resolution of problems was initiated and subsystem development was completed; upgrade of subsystem hardware suite was initiated. Project X0765, Underwater Hardware/Installation Systems - Research and development efforts were pursued in the following specific areas: array performance; lightweight, low-cost cable transmission system; long, towed array performance in various ocean environments; physical, environmental, and acoustic measurements in specific areas; and acoustic couplers. Concept validation experiments on embedment anchoring technique and test and

Program Element: 24311N
Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance
Budget Activity: 4 - Tactical Programs

evaluation were completed. Specifications for procurement were completed. Improved survey techniques to increase the scope, efficiency, and accuracy of acoustic measurements were developed, and advanced array acoustic studies and experiments were performed. A experiment was installed and evaluated. Fabrication and test of a sound source to be used in advanced arrays and system evaluation was completed, and improved cable splicing technique development were completed. Environmental acoustic and noise-fluctuation studies were conducted and oriented toward performance improvement. Design, fabrication and testing of tow body was completed for the acoustic projector to be used for calibration and certification of acoustic arrays. Initiated design, development and fabrication of shipboard cable handling equipment improvements and survey equipment for the installation of fixed systems. Completed development of acoustic projectors. Performed investigation of cables and interfacing of the undersea components with Lightweight Undersea Sensor Components. Recorded and reduced acoustic data from existing arrays to assess effectiveness; and developed performance predictions of optimum arrays. Developed an improved shipboard system for installation of arrays by cable layers. Continued investigation and development of trunk systems. Project X0766, Integrated Undersea Surveillance System Detection and Classification System Development - Mature signal, data and information processing hardware has evolved through several generations of shore electronics. The Western Electric/Bell Telephone Laboratories Electric Delay Line analog equipment was installed in the mid-1950's; the Magnetic Delay Line upgrade was installed in the late 1950's; and the Digital Spectrum Analyzer solid state technology processing equipment during the 1960's and early 1970's. Signal processing upgrades, to meet the Sound Surveillance System operational requirements of the late 1970s and early 1980s have been initiated Installation is underway system-wide The system installed as the provides analysis of data collected by the Sound Surveillance System. Initiate development of the Upgrade of a Phase 2 Completed development of the improved display architecture code for the Naval Ocean Processing Facility.

2. (U) FY 1982 Program: Project X0763, Integrated Undersea Surveillance System Design and Assessment - Provide modeling runs to generate system performance contours. Sound surveillance performance assessment efforts will continue. Sound Surveillance System diagnostic and operating systems development and operation of Integrated Undersea Surveillance Test and Integration Facility will continue. Maintenance support of research and development associated government furnished equipment by a central activity for greater cost effectiveness will continue. Phase 2 Backfit development and operational tests and evaluation deficiency corrections will be continued as well as the tests and evaluations. Training courseware plans for Phase 2 Backfit equipments will be

Program Element: 24311N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

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developed. Integrated Functional Test System I and II and the Unified Diagnostic Test System I will be completed. Training courseware will be completed. Project X0764, Integrated Undersea Surveillance System Development - Target Data Processor development efforts will continue with software revisions. The developments will continue. upgrade begins. Continue enhancements, and Acoustic Display Console developments. Technical and operational test and evaluation of the Training System Exerciser will be completed. Project X0765, Underwater Hardware/Installation Systems - Continue acoustic investigations and experiments consisting of noise measurement and analyses, array design and improvements. Continue development efforts on the acoustic survey system culminating in sea trials of the engineering development model. Project X0766, Integrated Undersea Surveillance System Detection and Classification System Development - Continue development on Phase 2 of the research test bed. Field installation and operational evaluation of Naval Facility slaving and remoting satellite interface multiplexer will be completed, and tailoring efforts for other sites will continue. Development of a computer alerting system will continue. The advanced will undergo technical and operational evaluations. Also, developments will continue as well as site tailoring for west coast consolidation.

3. (U) FY 1983 Planned Program: Project X0763, Integrated Undersea Surveillance System Design and Assessment - Phase 2 Backfit development and operational tests and evaluations and training continues. Performance prediction, operational performance assessment, and array characterization will continue. Software standardization and verification of the various systems to attain an Integrated Undersea Surveillance System will continue. Project X0764, Integrated Undersea Surveillance System Development - Target Data Processor development efforts will continue with software revisions. The developments will continue. System upgrade begins. Continue the enhancements, and Acoustic Display Console developments. Technical and operational test and evaluation of the Training System Exerciser will be completed. Project X0765, Underwater Hardware/Installation System - Continue acoustic investigations and experiments and development of cable technology and arrays. Continue development and evaluation of survey system and shipboard equipment improvements. Project X0766, Detection and Classification System Development - Development of

4. (U) FY 1984 Planned Program: Project X0763, Integrated Undersea Surveillance System Design and Assessment - Phase 2 training and Integrated Undersea Surveillance System integration efforts continue. Software developments will be dictated by fleet usage and evaluation, and changes in system parameters. System performance assessment, evaluation and array characterization continue. Project X0764, Integrated Undersea Surveillance System Development - Continue development efforts in the following areas: Software development for the Naval Ocean Processing Facility Target Data Processor and

Program Element: 24311N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

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resulting in improvements

Project X0765, Underwater Hardware/Installation System - Continue underwater hardware and array improvements, transmission system technology efforts, Continue development of installation and repair technology and shipboard equipment improvements. Complete acoustic survey system. Project X0766, Integrated Undersea Surveillance System Detection and Classification System Development - Continue development of

developments continue. Complete the Integrated Acoustic Display development and operational test and evaluation.

5. (U) Program to Completion: Project X0763, Integrated Undersea Surveillance System Design and Assessment - Complete Phase 2 Backfit testing on a subsystem level. Continue performance assessment and array characterization Towed Array Sensor System, Rapidly Deployable Surveillance System and Fixed Distributed System into the Integrated Sound Produce training courseware, maintenance procedures and diagnostic tests on subsystems as the subsystems are developed. Project X0764, Integrated Undersea Surveillance System Development - Complete enhancements. Complete the Target Data Processor revision 9 improvements. Project X0765, Underwater Hardware/Installation Systems - This is a continuing program. Project X0766, IUSS Detection and Classification System Development - Complete development and achieve baseline operational capability for these systems. Commence planned software improvements to these systems. These software enhancements will apply the results of continuing algorithm development to achieve new system capabilities. Complete planned enhancements to the System. Commence development of the Advanced Programmable Signal Processor.

6. (U) Milestones: Not applicable.

Project: X0763
Program Element: 24311N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Title: Integrated Undersea Surveillance System Design and Assessment
Title: Undersea Surveillance Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The realization of extended submerged capabilities by Soviet diesel submarines in the late 1940s significantly increased detection difficulties and led to development of the Sound Surveillance System with the initial installation completed in 1954. Basically, the system consists of passive hydrophone arrays, implanted on the ocean floor, which receive submarine radiated acoustic signals and transmit such signals by cable to shore terminals for electronic processing and display and manual analysis. The Sound Surveillance System, [redacted], provides significant detection capabilities against Soviet submarines and it remains the cornerstone of the Navy's anti-submarine warfare effort. However, continually changing Soviet submarine threat characteristics necessitates implementation of substantive system improvements to offset performance degradation owing to the operation of quieter targets in an increasing ocean ambient noise environment. This project provides near term development support of the Sound Surveillance System operations with the following specific objectives: (1) Continue [redacted] software development and software commonality for the Sound Surveillance System backfit program. (2) Continue a two-phase program of performance evaluation, array characterization and performance assessment. Establish an improved Sound Surveillance System performance baseline and identify sensitivity parameters. (3) Provide continuing systems engineering integration related to the overall Undersea Surveillance System. (4) Provide for the maintenance of government furnished research and development equipment installed at [redacted] sites.

(U) RELATED ACTIVITIES: This project supports efforts toward the establishment of an Integrated Undersea Surveillance System (IUSS) with resultant acoustic signal and information processing technology which relate to the following program elements: Program Element 63788N Rapidly Deployable Surveillance System; Program Element 24313N, Surveillance Towed Array Sensor System and Program Element 63784N ASW Surveillance.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Electronics Systems Engineering Activity, St. Inigoes, MD. Contractors: Bell Telephone Laboratories, Whippany, NJ; Western Electric Co., Greensboro, NC; TRW Systems, McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Mature signal, data and information processing hardware to meet approved ASW objectives for improved undersea surveillance performance has evolved through several generations of shore electronics. The Western Electric/Bell Telephone Laboratories Electric Delay Line analog equipment was installed in the mid-1950s, the Magnetic Delay Line upgrade was installed in the late 1950s, and the Digital Spectrum Analyzer solid state technology processing equipment during the 1960s and early 1970s. Signal processing upgrades, to meet the Sound Surveillance System operational requirements of the late 1970s and early 1980s, have been initiated [redacted]

Installation is underway system-wide to replace Electric/ Magnetic Delay

Project: X0763 Title: Integrated Undersea Surveillance System Design and Assessment
Program Element: 24311N Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

Line ; to replace the capability of the Digital Spectrum Analyzer ; and to provide threat-oriented spectrum analysis . The subsystem installed at provides analysis of threat contact data collected by the Sound Surveillance System. Communication subsystem upgrades at the include the Communications Processor for computer-aided message generation and handling functions, . Implementation of these system upgrades and improvements requires extensive use of mini-computers such as the AN/UYK-20 and AN/UYK-7 and standardized peripherals. Evaluation and prediction efforts established a current system performance baseline for subsequent use in Sound Surveillance System level configuration testing. Computer models were developed to study optimize new deployment location choices, evaluate new sensor and processing technology impact, analyze evaluation center target and provide support to operational commands. Sound Surveillance System software support to integrate Phase I Backfit software subsystems, conduct software development tests, and implement necessary software design changes was initiated. Sound Surveillance System performance assessment, which collects statistical data to assess the effect of electronic backfits on system performance, was initiated. Maintenance of government furnished development test beds was made a centralized responsibility of one activity for all backfit developments. An Integrated Undersea Surveillance R&D Test and Integration Facility was started in order to support software/hardware developments for the Phase 2 Backfit Navy standard computer based surveillance subsystems.

Development of a Training System Exerciser was initiated with training efforts on those new equipments included in the Phase 2 Backfit program; the system has been installed and is being evaluated.

2. (U) FY 1982 Program: Performance evaluation, predictions, generation of system performance contours and Sound Surveillance System performance assessment efforts will continue. Sound Surveillance System diagnostic and operating systems development and operation of the Integrated Undersea Surveillance Test and Integration Facility will continue. Maintenance support of R&D government funded equipment by a central activity for greater cost effectiveness and commonality of computer peripherals will continue. Phase 2 Backfit development and operational tests and evaluation deficiency corrections will be continued as well as Phase 2 Backfit development and operational tests and evaluations. Training courseware plans for Phase 2 Backfit equipments will be developed. Integrated Functional Test system I and II and the Unified Diagnostic Test system I will be completed. Training courseware for the Inter-Array Processor II and Target Data Processor will be completed.

3. (U) FY 1983 Planned Program: Phase 2 Backfit development and operational tests and evaluations and training will continue. Performance prediction, operational performance assessment and array characterization continue. Software standardization and verification and integration of the various systems to attain an Integrated Undersea Surveillance System continue.

Project: X0763 Title: Integrated Undersea Surveillance System Design and Assessment
Program Element: 24311N Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Phase 2 Training and Integrated Undersea Surveillance System integration efforts continue. Software developments will be dictated by fleet usage and evaluation, and changes in system parameters. System performance assessment, evaluation and array characterization continue. The increase in FY 1984 funding over the FY 1983 level is due to expanded efforts in test and evaluation, software support, software commonality and performance assessments.

5. (U) Program to Completion: Complete Phase 2 Backfit testing on a subsystem level. Continue performance assessment and array characterization. Produce training courseware, maintenance procedures and diagnostic tests on subsystems as the subsystems are developed.

6. (U) Milestones: Not applicable.

7. (U) Resource:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0763	Integrated Undersea Surveillance System Design and Assessment	7,874	7,065	12,110	17,297	Continuing	Continuing

Project: X0764

Title: Integrated Undersea Surveillance System Localization and Tracking Development

Program Element: 24311N

Title: Undersea Surveillance Systems

DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The realization of extended submerged capabilities by Soviet diesel submarines in the late 1940s significantly increased detection difficulties and led to development of the Sound Surveillance System with the initial installation completed in 1954. The system consists of passive hydrophone arrays, implanted on the ocean floor, which receive submarine radiated acoustic signals and transmit such signals by cable to shore terminals for electronic processing, display and manual analysis. The Sound Surveillance System, , provides significant detection capabilities against Soviet submarines and it remains the cornerstone of the Navy's Anti-Submarine Warfare effort. Continually changing Soviet submarine threat characteristics necessitate implementation of substantive system improvements to offset performance degradation owing to the operation of quieter targets in an increasing ocean ambient noise environment. This project provides for development of systems , which, with results of ongoing , improvement programs, will provide sufficient capacity and timeliness to support the Navy's ASW operations and offset the effects of threat submarine quieting and increased ambient noise.
improvements will include new software, software enhancements and displays, as well as revised operating procedures which increase , reporting capabilities. Improvements to be accomplished under this project include:

(U) RELATED ACTIVITIES: This project supports efforts toward the establishment of an Integrated Undersea Surveillance System with resultant acoustic signal and information processing technology which relate to the following program elements: Program Element 63788N, Rapidly Deployable Surveillance Systems, Program Element 24313N, Surveillance Towed Array Sensor System, Program Element 63784N ASW Surveillance.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (lead laboratory); Naval Electronics Systems Engineering Activity, St. Inigoes, MD. Contractors: Bell Telephone Laboratories, Whippany, NJ; Computing Devices Company, Ottawa, Canada; TRW Systems, McLean, VA; Western Electric Co., Greensboro, NC.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: An improved processing system laboratory model was evaluated by Bell Telephone Laboratories and the Navy in January 1972 and select hardware elements were subsequently tested and employed as signal processing and display components of the Manual Array Processing System. Proven technology from this system was integrated into Sound Surveillance System Phase I Backfit development. Operational Test and Evaluation was conducted on the major subsystems of the Phase I System Validation Model which includes the . development was initiated to integrate various System Validation Model subsystem interactive display formats and processed

Project: X0764

Title: Integrated Undersea Surveillance System Localization and Tracking Development

Program Element: 24311N

Title: Undersea Surveillance Systems

DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Budget Activity: 4 - Tactical Programs

data measurement techniques. as also initiated. model development was completed, and the unit was deployed at a field site for development testing. Development of was initiated to augment the initial design. Phase I Backfit program operational training, procedures standardization and manuals associated with the fleet introduction of the System Validation Model for the Sound Surveillance System were initiated. Developments] to reduce the number of operational personnel and for evaluations of the programmable signal processor technology as applied to the Sound Surveillance System signal processing were also initiated. Phase I Backfit subsystem segment testing was completed and the Pacific system technical evaluation was initiated. Phase II Backfit development test and evaluation was initiated Resolution efforts on the System Validation Model interfacing problems related to technical development of selected system options, deployment alternatives and Naval Ocean Processing Facility functions were initiated. The Sound Surveillance System Phase I Backfit operational evaluation was successfully completed as was the] technical evaluation. Development test and evaluation for Phase II Backfit was initiated.] subsystem development to upgrade the Sound Surveillance System operation was accomplished; the upgrade of the subsystem hardware suite has been initiated.

2. (U) FY 1982 Program: Target Data Processor development efforts will continue with software revisions. The Communication Processor interface developments will continue. Integrated communication system upgrade begins. Continue the enhancements, and Acoustic Display Console developments. Technical and operational test and evaluation of the Training System Exerciser will be completed.

3. (U) FY 1983 Planned Program: Target Data Processor resource allocation and continue and current software revisions will be complete. Development of] to support Phase 2 development continue as well as development of the enhancements. The decrease in funds between FY 1982 and FY 1983 results from migration of efforts to Project X0766.

4. (U) FY 1984 Planned Program: Continue development efforts in the following areas: software development for the Naval Ocean Processing Facility Target Data Processor']to improve thus resulting in improvements to the subsystems.

5. (U) Program to Completion: Complete enhancements. Complete the Target Data Processor revision 9 improvement.

Project: X0764

Title: Integrated Undersea Surveillance System Localization and Tracking Development

Program Element: 24311N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Title: Undersea Surveillance Systems
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0764	Integrated Undersea Surveillance System Localization and Tracking Development	21,120	22,808	7,901	10,064	Continuing	Continuing

Project: X0765 Title: Underwater Hardware/Installation Systems
Program Element: 24311N Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The realization of extended submerged capabilities by Soviet diesel submarines in the late 1940's significantly increased detection difficulties and led to development of the Sound Surveillance System with the initial installation completed in 1954. Basically, the system consists of passive hydrophone arrays implanted on the ocean floor which receive submarine radiated acoustic signals and transmit such signals by cable to shore terminals for electronic processing, display and manual analysis. The Sound Surveillance System provides significant detection capabilities against Soviet submarines and it remains the cornerstone of the Navy's Anti-Submarine Warfare effort. However, continually changing Soviet submarine threat characteristics necessitate implementation of substantive system improvements to offset performance degradation owing to the operation of quieter targets in an increasng ocean ambient noise environment. This project provides near term development of underwater electronic component and cable technology improvements which, when taken with the results of the on-going improvement program, will extend present system capabilities.

(U) RELATED ACTIVITIES: The technology improvements emerging from this project will be applicable to Lightweight Undersea Sensor Component development being pursued under Program Element 63784N, Project X0756.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (lead laboratory); Naval Research Laboratory, Washington, DC. Contractors: Bell Telephone Laboratories, Whippany, NJ; TRW Systems, McLean, VA.

PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: Research and development efforts were pursued in the following specific areas: array performance; lightweight, low-cost cable transmission system; physical, environmental, and acoustic concept validation experiments on embedment anchoring techniques and demonstration model test and evaluation were completed and specifications for procurement of units were completed. Improved survey techniques to increase the scope, efficiency, and accuracy of acoustic measurements were developed and advanced array acoustic studies and experiments were performed. The array was installed and evaluated and the experiment completed. A sound source to be used in advanced arrays and system evaluation was fabricated, tested and completed. developments were completed. Environmental acoustic and noise fluctuation studies were conducted and oriented toward performance improvements. Design, fabrication and testing of a towed body was completed for the acoustic projector to be used for calibration and certification of acoustic arrays. Improved installation and repair technology test and evaluation, underwater hardware system improvement and advanced systems acoustic investigations and experiments were continued. Completed development of acoustic projectors for enhanced capability. Initiated design, development and fabrication of shipboard cable handling equipment improvements as well as survey equipment for the installation of fixed systems. Performed investigation of

Project: X0765 Title: Underwater Hardware/Installation Systems
Program Element: 24311N Title: Undersea Surveillance Systems
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

types of undersea cables and interfacing of the undersea components with the Lightweight Undersea Sensor Components. Recorded acoustic data from existing operational arrays, reduced and analyzed the data and compiled and documented relevant acoustic facts and measurements to assess effectiveness; determined long term statistical nature of ambient noise using realtime monitoring and analysis of data; examine array requirements based on , array data previously obtained; developed performance predictions of optimum arrays. Continued investigation and development of trunk systems. Developed an improved shipboard system for installation of arrays by cable layers.

2. (U) FY 1982 Program: Continue acoustic assessments and experiments including noise measurement analysis, array design and improvements. Continue underwater hardware improvements work on transmission systems, communications, power and cable technology. Continue development efforts on the acoustic survey system culminating in sea trials of the engineering development model.

3. (U) FY 1983 Planned Program: Continue acoustic investigations and experiments and development of cable technology and arrays. Continue development and evaluation of survey system improvements.

4. (U) FY 1984 Planned Program: Continue underwater hardware and array improvements, transmission system technology efforts, and fiber optic applications. Continue development of installation and repair technology improvements. Complete acoustic survey system. The increase in FY 1984 funding over the FY 1983 level is due to expanded efforts in array and transmission system technology improvements.

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimated	FY 1983 Estimated	FY 1984 Estimated	Additional to Completion	Total Estimated Cost
X0765	Underwater Hardware/Installation Systems	4,096	5,021	9,537	14,537	Continuing	Continuing

Project: X0766

Title: Integrated Undersea Surveillance System Detection and Classification System Development

Program Element: 24311N

Title: Undersea Surveillance Systems

DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The realization of extended submerged capabilities by Soviet diesel submarines in the late 1940s significantly increased detection difficulties and led to development of the Sound Surveillance System with the initial installation completed in 1954. Basically, the system consists of passive hydrophone arrays, implanted on the ocean floor, which receive submarine radiated acoustic signals and transmit such signals by cable to shore terminals for electronic processing, display and manual analysis. The Sound Surveillance System,

) provides significant detection capabilities against Soviet submarines and it remains the cornerstone of the Navy's Anti-Submarine Warfare effort. However, continually changing Soviet submarine threat characteristics necessitate implementation of substantive system improvements to offset performance degradation owing to the operation of quieter targets in an increasing ocean ambient noise environment. This project provides for the application of state-of-the-art computer and display technology in the development of improved signal and data processing techniques. This effort is directed toward the detection and classification of targets to meet the following objectives;

, systems

currently under development in this project include

(U) RELATED ACTIVITIES: This project supports efforts toward the establishment of the Integrated Undersea Surveillance System, and specific acoustic signal and information processing technology developments which relate to the following program elements: Program Element 63784N, ASW Surveillance; Program Element 63788N, Rapidly Deployable Surveillance System; and Program Element 24313N, Surveillance Towed Array Sensor System.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Engineering Activity, St. Inigoes, MD; Office of Naval Research, Washington, DC. Contractors: Bell Telephone Laboratories, Whippany, NJ; TRW Systems, McLean, VA; ENSCO Inc., Springfield, VA; Computing Devices Company, Ottawa, Canada; General Electric Company, Syracuse, NY.

Project: X0766

Title: Integrated Undersea Surveillance System Detection and Classification System Development

Program Element: 24311N

Title: Undersea Surveillance Systems

DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Mature signal, data and information processing hardware to meet approved ASW objectives for improved undersea surveillance performance has evolved through several generations of shore electronics. The Western Electric/ Bell Telephone Laboratories Electric Delay Line analog equipment was installed in the mid-1950s, the Magnetic Delay Line upgrade was installed in the late 1950s, and the Digital Spectrum Analyzer solid state technology processing equipment during the 1960s and early 1970s. Signal processing upgrades, to meet the Sound Surveillance System operational requirements of the late 1970s and 1980s, have been initiated for:
Installation is underway system-wide to replace the Electric/Magnetic Delay Line

The Target Data Processor subsystem installed at the provides analysis of threat contact data collected by the Sound Surveillance System. Communication subsystem upgrades at the include the Communications Processor for computer-aided message generation and handling functions, Development of the was initiated. Development has begun on A Phase 2 upgrade was initiated. Phase 2 Backfit development was initiated on the . Naval Ocean Processing Facility improved display architecture code developments were completed.

2. (U) FY 1982 Program: Continue development on Phase 2 research test bed. Field installation and operational evaluation of Naval Facility slaving/remoting satellite interface multiplexer will be completed, and tailoring efforts for other sites will continue. Development of the system will continue. The advanced will undergo technical and operational evaluations. developments will continue, as well as site tailoring for the west coast consolidation. The increase in FY 1983 funding over the FY 1982 level in this project is due to the migration of several efforts from other projects under PE 24311N as a result of program restructuring in FY 1982.

3. (U) FY 1983 Planned Program: Development of algorithms, will continue.

Project: X0766

Title: Integrated Undersea Surveillance System Detection and Classification System Development

Program Element: 24311N

Title: Undersea Surveillance Systems

DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue development of

developments continue. Complete the development and operational test and evaluation. The increase in FY 1984 funding over the FY 1983 level is due to accelerated efforts in processing developments which have been delayed by Navy-wide budget reductions experienced since FY 1982.

5. (U) Program to Completion: Complete development of and achieve baseline operational capability for these systems. Commence planned software improvements to these systems. These software enhancements will include and will apply the results of continuing algorithm development to achieve new system capabilities in Complete planned enhancements to the Commence development of the Advanced Programmable Signal Processor.

6. (U) Milestones: Not applicable.

7. (U) Resource:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0766	Integrated Undersea Surveillance System Detection and Classification System Development	18,154	13,704	20,101	27,006	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24313N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Surveillance Towed Array Sensor
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,769*	6,364	7,070	0	0	128,628
X0758	Surveillance Towed Array Sensor	6,769	6,364	7,070	0	0	128,628

*Funding from PE 64789N, (Anti-Submarine Warfare) in FY 1981.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for improvements to the Surveillance Towed Array Sensor which provides the capability for positioning a sensor as needed to detect and maintain contact with submarines in ocean basins worldwide. The Surveillance Towed Array Sensor will provide a mobile, long range, passive surveillance capability against current and projected threat submarines in ocean areas of national interest.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 funds are required to develop product improvements and correct deficiencies identified during the Surveillance Towed Array Sensor test and evaluation. The increase in FY 1983 over FY 1982 ($706,000) ensures completion of the engineering development and deficiency correction. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1983 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary result in a total estimated cost increase of $1,087. This increase consists of the following: a -$584 adjustment for the correction of errors prior to FY 1979; FY 1981 increase in actual cost of $1,955 over FY 1981 estimate resulting from reprogramming $1,999 for the completion of operational system development including the correction of minor deficiencies identified during operational evaluation, and a decrease of $44 for escalation adjustment; decreases of $94 in FY 1982 and $225 in FY 1983 reflect escalation adjustments.

Program Element: 24313N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surveillance Towed Array Sensor
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980* Actual	FY 1981* Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
X0758	Surveillance Towed Array Sensor	13,692	4,814	6,458	7,295	0	127,541

*Funding from PE 64789N, (Anti-Submarine Warfare) in FY 1980 and FY 1981.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
SCN (T-AGOS)	180,800	155,800	0	0	0	*447,300
Quantity	(5)	(4)	(0)			(12)
SCN (SWATH AGOS)			24,300	183,700	914,900	*1,122,900
Quantity			(0)	(1)	(5)	(6)
OPN	15,021	15,693	13,942	10,990	25,148	**87,994
Quantity	N/A	N/A	N/A	N/A	N/A	N/A
O&MN	5,082	7,001	16,230	39,525	273,080	***340,918
Quantity	N/A	N/A	N/A	N/A	N/A	N/A

*PE 24313N (excludes outfitting and post delivery)
**PE 24313N (excludes interim/initial spares)
***PE 24313N and PE 72827N (excludes replenished spares) through FY 1987

Program Element: 24313N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surveillance Towed Array Sensor
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Threat submarine surveillance is required in ocean areas of national interest with existing undersea surveillance being provided primarily by the fixed Sound Surveillance System. However, threat submarine characteristics and tactics are continually changing which requires that the Sound Surveillance System performance be improved and augmented by flexible (mobile and deployable) systems in order to effectively employ the limited Anti-Submarine Warfare tactical forces and resources available. Navy studies have identified the Surveillance Towed Array Sensor as a cost effective means of countering the threat with maximum flexibility. Towed arrays provide significant passive performance improvement over conventional hull-mounted sensors since larger acoustic apertures can be employed and they can be positioned remote from their own ship's noise. Towed array development was initiated in FY 1968 and initially led to the deployment of three AN/SQR-14 interim towed array surveillance system equipped ships to the Mediterranean Sea from FY 1970 through FY 1973. These systems have since been replaced by the six AN/SQR-15 towed array surveillance system units. Decreases in threat noise levels, changes in submarine operating patterns, and recognition of an immediate need to enhance existing surveillance capability resulted in an increased emphasis on towed array technology improvements. A fleet of 12 T-AGOS and 6 SWATH AGOS ships will be built to be operated as dedicated Surveillance Towed Array Sensor platforms. Surveillance Towed Array Sensor ships will tow [redacted] Acoustic data from targets within a range [redacted] will be relayed by satellite to a central shore station for processing, display, analysis [redacted]

(U) RELATED ACTIVITIES: This program will result in the development of one component of a totally integrated undersea surveillance system (IUSS). Acoustic signal data and information processing technologies developed under the following program/projects will have applicability: Program Element 63794N, ASW Surveillance; Program Element 24311N, Undersea Surveillance System; Program Element 63795N, Long Range Acoustic Propagation; Program Element 63788N, Rapidly Deployable Surveillance System. The satellite terminal is being developed under Program Element 33109N, Satellite Communications. A reduced diameter surveillance towed array will be developed under PE 64789N, Surveillance Towed Array Sensor commencing in FY 1984.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (Lead Laboratory). Contractors: Hughes Aircraft Company, Fullerton, CA; and TRW Systems, McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Towed Array Surveillance System/Tactical Towed Linear Surveillance System program was established in June 1973 following a May 1973 Deputy Secretary of Defense program initiation decision under PE 63794N, Project X24X2. During advanced development of the surveillance portion of this program, existing experimental towed array assets were subjected to extensive sea tests to demonstrate Navy readiness to enter full scale development. In FY 1975 system nomenclature was changed from Towed Array Surveillance System and a separate project (X2423) was assigned. Surveillance Towed Array Sensor full scale development approval was received in November 1974 pursuant to a Defense Systems Acquisition Review Council II program

decision. Four contractors were awarded Surveillance Towed Array Sensor Engineering Development Model technical proposal and specification development contracts in October 1974. Engineering development commenced in FY 1976 under Program Element 64789N, Project X0758-OS, with a contract for the design/fabrication of the engineering development model sonar segment being awarded to Hughes Aircraft Company in September 1975. In-house Naval personnel were tasked to design and fabricate the engineering development model communications/navigation segment from existing equipments. Contracts for modification and operation of the research vessel MOANA WAVE as the engineering development model platform were awarded to the University of Hawaii in November 1976. Technical evaluation by Naval Electronic Systems Command was conducted in February and March 1978. Basic system performance objectives were demonstrated; however, array reliability problems were identified. The telemetered array was replaced in April 1978 with an alternate hard-wired array and was tested at-sea through August 1978. Computer software maturity problems were then identified. System level field testing was terminated to permit removal of processing and display equipment from research vessel MOANA WAVE and from the shore site at Norfolk, VA. A software performance baseline was established at the Surveillance Towed Array Sensor software maintenance facility at Point Loma, CA. Software was rebuilt to the required system performance level, while parallel at-sea testing of the alternate hard-wired array continued. System sea testing resumed in fourth quarter FY 1979. Technical evaluation by Naval Electronic Systems Command was again conducted October 1979 to March 1980. Acoustic performance was excellent and problems of array reliability and computer software were rectified. Operational evaluation by Commander, Operational Test and Evaluation force was conducted March to May 1980. The system was found to be operationally effective and potentially operationally suitable. Provisional approval for service use was granted in December 1980. OSD production approval was granted in February 1981. In April 1981, OSD approved shortening of the very low frequency array aperture. Approval for service use (with the reduced array aperture, less the AN/WSC-6 super high frequency satellite communication terminal) was granted by CNO in September 1981 based on the results of follow-on operational test and evaluation which verified correction of noted operational evaluation deficiencies and the operational performance of the shortened array. A waiver was obtained in August 1981 to procure a limited number of AN/WSC-6 in advance of approval for service use. Testing will be conducted on the first production Surveillance Towed Array Sensor system with the AN/WSC-6 to obtain full system level approval for service use. Correction of deficiencies identified during test and evaluation and development of product improvements commenced.

2. (U) FY 1982 Program: Operational systems development commenced under PE 24313N. Product improvement and deficiency correction development, test and evaluation will continue.

3. (U) FY 1983 Planned Program: Product improvement and deficiency correction efforts will be completed.

4. (U) FY 1984 Planned Program: Not applicable.

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

Program Element: 24313N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surveillance Towed Array Sensor
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	Milestones		Date
a.	Completed Advanced Development Studies; Received Full Scale Development Approval		Oct 74
b.	Completed Engineering Development Model Specification Development; Awarded Engineering Development Model Design and Fabrication Contract		Sep 75
c.	Completed Engineering Development Model Design		Dec 76
d.	Completed Engineering Development Model Fabrication		Sep 77
e.	Completed Engineering Development Model Installation		Feb 78
f.	Completed the Operational Evaluation		May 80
g.	Received Production Approval	*(Dec 1980)	Feb 81
h.	Complete Operational Systems Development		FY 83

*Date in parenthesis is milestone date shown in FY 1982 Program Element Descriptive Summary. Delay of two months due to administrative delays to the Defense Systems Acquisition Review Council III process.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24571N
Title: Special Projects
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	(2,384)*	(7,957)*	6,720	11,850	Continuing	Continuing
W0431	Tactical Aircrew Combat Training System	(1,924)*	(1,942)*	2,557	2,723	Continuing	Continuing
W1414	Integrated Air Warfare Training Complex - Fallon	(460)*	(6,015)*	4,163	9,127	Continuing	Continuing

* FY 1982 and prior funding is reported under PE 24161N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Further development of the Tactical Aircrew Combat Training System (formerly Air Combat Maneuvering Range) is required to extend the current superior training capability in air-to-air combat to other phases of air warfare, e.g., air-to-surface and defense suppression; to provide comprehensive interface with additional tactical aircraft; and to include realistic electronic warfare simulation in all training exercises. A complementary development employing the same technology was initiated in FY 1982 to provide a modern instrumented range at Naval Air Station, Fallon, NV, for graduate training of Navy and Marine Corps Squadrons. This project has been identified by the Tactical Air Commanders as their highest priority training range requirement.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 effort in the Tactical Aircrew Combat Training System Project includes completion of the tesing of an internal aircraft instrumentation subsystem package to provide the system interface with the F/A-18 weapons data bus; intiation of phoenix interface, development of a prototype unit to provide training in the use of radar warning receivers installed in tactical aircraft; and development of additional weapon simulations to extend the system capabilities. Also in FY 1983 the continued development and fabrication of the Integrated Air Warfare Training Complex tracking, control, and display subsystems. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT DESCRIPTIVE SUMMARY: (Dollars in Thousands) There were no estimates in this program element for FY 1982 since these two projects were under PE 24161N at that time. The changes between the funding profile shown in the FY 1982 Descriptive Summary (PE 24161N) and that shown in this Descriptive Summary result in FY 1982 from a $2,000

Program Element: 24571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Special Projects
Budget Activity: 4 - Tactical Programs

Congressional reduction, a $4,500 anticipated transfer from APN which never occurred, and other budget adjustments. The decision to restructure the Integrated Air Warfare Training Complex development effort for procurement of a sixteen aircraft Tactical Aircrew Combat Training System ground system for Naval Air Station, Fallon, NV, is reflected in the $1,640 increase in FY 1983 funding. Besides this change in the program element scope, minor adjustments in FY 1983 reflect refined estimates of inflation.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,342	1,847	15,637	5,080	Continuing	Continuing
W0431	Tactical Aircrew Combat Training System	2,342	1,847	1,988	2,174	Continuing	Continuing
W1414	Integrated Air Warfare Training Complex - Fallon	0	0	13,649	2,906	961	17,516

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	853	5,731	7,839	6,674	Continuing	Continuing
APN	1,500	3,200	4,887	4,057	Continuing	Continuing
Quantity*	0	14	13	13	Continuing	Continuing

* Quantities shown are for aircraft instrumentation subsystems procured with APN for both the Tactical Aircrew Combat Training System and the Integrated Air Warfare Training Complex.

Program Element: 24571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Special Projects
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Given the capabilities of modern sophisticated weapon systems and the probability of relatively equal capabilities of threat systems, the outcome of any future conflict will probably be determined by the relative proficiency of the weapon system operators. During the conflict in Southeast Asia, the Navy recognized a need to improve the training of aircraft operating crews in order to increase their relative proficiency in air combat maneuvering. For this purpose the Tactical Aircrew Combat Training System (formerly Air Combat Maneuvering Range) was developed. The current fixed shorebased Tactical Aircrew Combat Training Systems cover an area on the ground and overhead airspace approximately 30 miles in diameter. They provide precise measurement of aircraft position and motion for up to eight aircraft simultaneously and capability for continuous, instantaneous assessment of aircraft and weapon system performance during the highly dynamic air combat maneuvering situation. Aircraft engaged in free "dog-fights" are tracked by multilateration techniques. Tracking data and aircraft performance data transmitted from an instrumentation pod on each aircraft are inserted into the computation and control subsystem and monitored by a Range Training Officer who provides instructional and safety of flight directions to the aircrews through voice radio link. All data is recorded for subsequent debrief replay to permit the aircrews involved to evaluate their performance. Experience with the two operational Tactical Aircrew Combat Training Systems indicates they provide superior training in air-to-air warfare and have an inherent potential for extension to improved training in air-to-ground, defense suppression and Electronic Warfare tactics. These two development projects will exploit this potential. In the Tactical Aircrew Combat Training System project, the system developments include (1) development and test of an F/A-18 internal aircraft instrumentation subsystem to make the Tactical Aircrew Combat Training System interface with the weapon system data bus thereby increasing significantly the scope and quality of the training available to aircrews flying these aircraft; (2) development and test of interface devices to provide a capability for the Tactical Aircrew Combat Training System to present realistic simulation of Electronic Warfare signal effects on airborne radar warning receiver cockpit displays and to evaluate aircrew responses to these presentations thereby increasing both the realism of the training scenario and the evaluation of aircrew performance; (3) development and implementation of simulation models for additional air-to-air and air-to-ground weapon systems to increase the scope of training available, and (4) development and test of interface devices to permit transmission of aircraft and weapon system data from additional aircraft. The objective of the Integrated Air Warfare Training Complex project is to develop a modern instrumented arena in the military operations areas near Fallon, NV, to provide essential training for Tactical Air units. The Integrated Air Warfare Training Complex will integrate state vector tracking, computation, control, and display subsystems to provide for conduct of realistic multiple simultaneous air-to-air, air-to-ground and defense suppression engagements for up to thirty-six aircraft.

(U) RELATED ACTIVITIES: The first Tactical Aircrew Combat Training System developed as an Air Combat Maneuvering Range in the period FY 1970 through 1974, is now operational at Yuma, AZ. A second system has been installed on the East Coast off Cape Hatteras. Similar systems have been procured by the Navy for the USAF and installed at Nellis AFB, NV, Tyndall AFB, FL, Luke AFB, AX, and in the Mediterranean. Additional USAF systems are being procured for installation in Korea, Okinawa, and Holloman AFB, NM.

Program Element: 24571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Special Projects
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Fleet Analysis Center, Corona, CA; Naval Air Test Center, NAS Patuxent River, MD; Air Test and Evaluation Squadron Four (VX-4), Point Mugu, CA; Air Test and Evaluation Squadron Five (VX-5), China Lake, CA. Contractor: Cubic Corporation, San Diego, CA; SRI International, Menlo Park, CA. Systems Engineering Technology Associates Corporation, Newport Beach, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The initial Air Combat Maneuvering Range development was completed and the first system became operational in December 1974. Since 1977 two Tactical Aircrew Combat Training Systems have been operational and system improvements (funded with procurement appropriations) have eliminated early system shortcomings resulting in a recommendation for "Approval for Service Use". Recent development effort has provided a demonstration of the feasibility of designing a system capable of deploying with a carrier task force. FY 1981 effort has focused on extending the system to F/A-18 training and providing Electronic Warfare capability. Definition of design requirements for F/A-18 interface with the Tactical Aircrew Combat Training System has been completed and a development contract awarded for the design and fabrication of an internal aircraft instrumentation subsystem. Laboratory demonstration of the Tactical Aircrew Combat Training System Electronic Warfare simulation using the ALR-45F radar warning receiver has also been completed. Specifications and interface control documents have been prepared to apply this training system technology to the Integrated Air Warfare Training Complex development.

2. (U) FY 1982 Program: Development of the F/A-18 internal aircraft instrumentation subsystem will continue with fabrication and development testing of prototype units. Final design and fabrication of flight test models of the radar warning receiver interface device will commence with a limited flight test to demonstrate the feasibility to provide realistic Electronic Warfare training capability at all Tactical Aircrew Combat Training Systems. The Integrated Air Warfare Training Complex development will be initiated with award of a contract to provide the first phase of the state vector tracking, control, and display subsystems at Fallon, NV. This system will further apply the technology developed in the Tactical Aircrew Combat Training System and will employ common aircraft instrumentation subsystems thereby reducing both development and procurement costs.

3. (U) FY 1983 Planned Program: Complete Technical Evaluation and Operational Test and Evaluation of the F/A-18 internal aircraft instrumentation subsystem and Tactical Aircrew Combat Training System software modification. Initiate development of the capability for the Tactical Aircrew Combat Training System to train aircrews in employment of the AIM-54 Phoenix missile system. Commence development of interface capability to permit AV-8A/B/C aircraft to participate in air-to-ground weapons training exercises.

Program Element: 24571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Special Projects
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Technical evaluation and follow-on operational evaluation of the AV-8B capability to conduct air-to-ground weapons training on Tactical Aircrew Combat Training System will be completed. Development of the AIM-54 training capability will be completed and demonstrated. Develop new weapon simulations and update existing weapon simulations based on current intelligence data. Installation of the Fallon range instrumentation will be completed for testing in FY 1985.

5. (U) Program to Completion: The Tactical Aircrew Combat Training System project will be a continuing program to develop additional simulations of new or increased performance weapon systems and appropriate aircraft interfaces and to expand the Electronic Warfare simulation capability to include all significant systems in current and newly developed combat aircraft. This continuing development is essential to maintain the superior training capability derived from the existing systems.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24573N
Title: Navy Cover and Deception Program
DoD Mission Area: 374 - Multi-Mission, Technology & Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,798	13,305	14,312	12,794	7,789	82,908
X0805	Integrated Cover and Deception System	2,121	5,288	5,955	4,392	1,414	38,916
X0849	Offboard Deception Devices	5,677	8,017	8,357	8,402	6,375	43,992

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Cover and Deception Program is concerned with

- The approach is to

using devices developed under the Integrated Cover and Deception System and Offboard Deception Devices projects described herein.

(U) BASIS FOR FY 1983 RDT&E REQUEST: FY 1983 funding will produce the following results: Project X0805, Integrated Cover and Deception System will complete engineering development and obtain Approval for Service Use of the

. In addition FY 1983 funds will be used to initiate development of an upgrade for the AN/SLQ-34 processor to enable the AN/SLQ-34 to handle the complex wave forms of projected threat radars. The final task in the Integrated Cover and Deception System (ICAD) project will be to initiate the development a low frequency transducer for the Ship Towed Acoustic Deception Device to deceive the projected threat towed arrays. Project X0849, Offboard Deception Devices funding will be used to continue development of the shipboard

devices will be used by the Cover and Deception planners to test and program

. Funds will also be used to initiate development to provide a communication source,

. Service approval will be obtained.

The overall increased funding in this program element ($1,007) is the result of acceleration of X0805 Integrated Cover and Deception System efforts and restructuring of X0849 Offboard Deception Devices efforts. The above funding profile includes outyear escalation and all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: X0805 Integrated Cover and Deception. Decreases in FY 1981 ($150) and FY 1982 ($78) were due to routine budget adjustments. Increase in 1983 ($2,795) is to accelerate

development of cover and deception equipment. X0849 Offboard Deception Devices. Decreases in FY 1981 ($52) and FY 1982 ($119) were due to routine budget adjustments. Decrease in FY 1983 ($1,230) was the result of program restructuring and more definitive cost estimates.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,265	8,000	13,502	12,747	Continuing	Continuing
X0805	Integrated Cover and Deception System	4,558	2,271	5,366	3,160	Continuing	Continuing
X0849	Offboard Deception Devices	2,707	5,729	8,136	9,587	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Navy							
X0805	INTEGRATED COVER AND DECEPTION SYSTEM						
	(Quantity) SLQ-34						
	AN/SPS-48						
	SLR-22						
	SKR-7						
	AN/SPS-49						
X0849	OFFBOARD DECEPTION DEVICES						
	(Quantity) Jamming I						
	C-Band SPS-48						
	HF						
	F-band SPS-49						
	Jamming II						
	B-Band						
	J-Band						
	Acoustic						

Program Element: 24573N
DoD Mission Area: 374 - Multi-Mission, Technology & Support

Title: Navy Cover and Deception Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: X0805: The Integrated Cover and Deception System project addresses the mission need of defeating

One van, the AN/SSQ-74(V)1 is Major items of its equipment are
The other van, the AN/SSQ-74(V)2 is directed

The AN/SLQ-34 provides
The AN/SLQ-33 ship-towed

Future efforts involve the development of for the AN/SLQ-33, development of new

X0849: The Offboard Deception Devices are a family of expendable and reuseable devices (buoys)

(U) RELATED ACTIVITIES: This project deals with the military problem

developed under various Anti-Submarine Warfare projects.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA. Contractor: Honeywell, Inc. Seattle, WA; Raytheon Co, Waltham, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: X0805: The Integrated Cover and Deception System obtained service approval, delivered the AN/SSQ-74(V) electronic deception system and completed the AN/SLQ-33 evice formal Technical Evaluation and Operational Evaluation. Completed engineering development of to improve effectiveness of AN/SLQ-33 Initiated development to enhance effectiveness of the AN/SSO-47(V). X0849: Offboard Deception Devices completed development and obtained

service approval and initiated advanced development of radars.

2. (U) FY 1982 Program: X0805: Integrated Cover and Deception System will obtain service approval for the AN/SLQ-34 and AN/SLR-22, continue development of the and continue development of the X0849: Offboard Deception Devices will complete engineering development

3. (U) FY 1983 Planned Program: X0805: Integrated Cover and Deception System will take delivery of the AN/SLQ-34 and SLR-22 for installation at testing facility, complete improvement of the AN/SLQ-33, and complete the testing X0849: Offboard Deception Devices will complete Shipboard Test Model complete development develop Shipboard Test Model specifications for

4. (U) FY 1984 Planned Program: X0805: Integrated Cover and Deception System will continue delivery of the AN/SLQ-34 and AN/SLR-22, complete Approval for Service Use and procure the AN/SSQ-74(V). X0849: Offboard Deception Devices will complete engineering development

5. (U) Program to Completion: X0805: This project will initiate development of the AN/SSQ-74(U). X0849: Offboard Deception and Devices will complete engineering

6. (U) Milestones: Not applicable.

Project: X0805 Title: Integrated Cover and Deception System
Program Element: 24573N Title: Navy Cover and Deception Program
DoD Mission Area: 374 - Multi-Mission, Technology & Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Integrated Cover and Deception System project addresses the mission need of defeating through two separate hardware developments, the AN/SSQ-74(V) and the AN/SLQ-33. The AN/SSQ-74(V) electronic deception system is configured in two separately deployable components (vans) enclosing separate groups of One van, the AN/SSQ-74(V)1 is directed

The other van, the AN/SSQ-74(V)2 is directed against

The AN/SLQ-33 includes shipboard electronics, winch assembly, and a towed body containing acoustic transducers. Both the AN/SSQ-74(V) and the AN/SLQ-33 equipments are intended for specifically selected by the fleet commanders to be "mission configured" for cover and deception purposes. Development efforts are ongoing to reduce size and complexity of current systems and to upgrade the AN/SSQ-74 and the AN/SLQ-33 systems. Upgrades include

(U) RELATED ACTIVITIES: This project deals with

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA. Contractors: ITT Avionics Division, Nutley NJ; Honeywell, Inc., Seattle, WA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Obtained service approval of AN/SSQ-74 electronic deception system and service approval for ship towed AN/SLQ-33. Initiated engineering development of the . Initiated development of

Project: X0805 — Title: Integrated Cover and Deception System
Program Element: 24573N — Title: Navy Cover and Deception Program
DoD Mission Area: 374 - Multi-Mission, Technology & Support — Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Complete engineering development and obtain approval for service use for the AN/SPS-48 and continue development of AN/SPS-49. Initiate development of the AN/SLQ-34.

3. (U) FY 1983 Planned Program: Complete engineering development and obtain Approval for Service Use for AN/SPS-49 for the SLQ-34. Initiate development of upgrade for AN/SLQ-34. The increase in funding between FY 1982 and FY 1983 ($667) reflects an acceleration of the

4. (U) FY 1984 Planned Program: Obtain approval for service use of transducer. Procurement of two additional SLQ-33's.

5. (U) Program to Completion: Undertake redesign of AN/SSO-74(V) and AN/SLQ-33 systems to reduce size, weight and complexity and to improve human engineering and safety features. This project will initiate development of these objectives. Procurement of two additional SLQ-33's.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0805	Integrated Cover and Deception System						

Project Number: X0849
Program Element: 24573N
DOD Mission Area: 374 - Multimission Technology & Support

Title: Offboard Deception Devices
Title: Navy Cover and Deception Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project addresses the need to provide fleet commanders with the capability of with a family of expendable, offboard devices (e.g. buoys) which can prevent the location of our forces. These devices are individually designed

The general approach is to develop a family of buoys which for reasons of economy and flexibility, employ sonobuoy design features proven in Navy service use over many years and which incorporate techniques developed in other programs but not previously applied to offboard devices. Development is ongoing. Subsequently will come eight separate

(U) RELATED ACTIVITIES: This project draws heavily from the experience of Navy contractors who have developed sonobuoys for the Naval Air Systems Command's anti-submarine warfare program over many years under project X0805 Integrated Cover and Deception Systems for the Naval Electronics Systems Command over the past five years. Continuous inputs from Navy intelligence-gathering and analysis activities are basic to insure that design of technical features of these devices keep pace with the operational requirements.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren, VA. Contractors: Motorola, Inc., Scottsdale, AZ; Magnavox, Inc., Ft Wayne, IN; Litton AMECOM, Inc., College Park, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed development of and obtained approval for service use

Project Number: X0849
Program Element: 24573N
DOD Mission Area: 374 - Multimission Technology & Support

Title: Offboard Deception Devices
Title: Navy Cover and Deception Program
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Obtain approval for service use

3. (U) FY 1983 Planned Program: Continue development of

, Increase in funding in FY 1983 over FY 1982 ($340) is for the devices.

4. (U) FY 1984 Planned Program: Initiate development of

5. (U) Program to Completion: Complete development and obtain Approval for Service Use

6. (U) Milestones: N/A

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
X0849	Offboard Deception Devices	5,677	8,017	8,357	8,402	6,375	43,992

FY 1983 RDT&E,N DESCRIPTIVE SUMMARY

Program Element: 24575N
Title: Electronic Warfare Support
DoD Mission Area: 374 - Multimission, Technology and Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (DOLLARS IN THOUSANDS):

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,431	16,509	8,014	10,561	Continuing	Continuing
X0668	Electromagnetic Performance of Aircraft and Ship Systems	1,087	5,443	3,881	3,461	Continuing	Continuing
X0705	Communication Security Assessment Program	502	988	0	0	0	6,870
X0898	Fleet Electronic Warfare Support Group	3,345	4,669	3,703	6,755	Continuing	Continuing
R1015	Electronic Warfare Master Plan	497	398	430	425	Continuing	Continuing
X1370	Command, Control and Communications Countermeasures Development	0	5,011	*	*	*	*

*Project is funded in Program Element 24576N in FY 1983 and out.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop operational systems that simulate Electronic Countermeasures and selected electronic weapons to exercise fleet capabilities in command and control, anti-air warfare, anti-surface warfare and Electronic Counter Countermeasures. Provide the capabilities and environment for test and evaluation of new command and control and weapons systems. Determine and assess vulnerabilities of U.S. Navy ships and aircraft resulting from emission exploitation, sensor and command and control degradation and system deficiencies. Support planning in electronic warfare areas leading to formulation of operational concepts and identification of future deficiencies and requirements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Electromagnetic Performance of Aircraft and Ships Systems requirements for FY 1983 are: extend system frequency coverage expand coverage selectively upgrade older equipment, incorporate redundancy into single mission critical systems, and procure a measurements system. The decrease in funds of $8,495 thousand from FY 1982 to FY 1983 is the result of major engineering development in FY 1982. Communication Security Assessment program tasks will not be funded in FY 1983. The Fleet Electronic Warfare Support Group program consists of completing the development of jammers and the continuation of development to provide jammer. The Electronic Warfare Master Plan Project will continue with updates in FY 1983. A new start for the development of

counter communications, command and control concepts in FY 1982 will transition to a seperate program element in FY 1983. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are the result of changes in program scope and refined estimates of costs including adjustments for inflation (-1814 in FY 1981, -3,124 in FY 1982 and -998 in FY 1983). Counter Command, Control and Communications project is a new start in FY 1982, and will transition to a separate program element, 24576N, in FY 1983 resulting in a decrease of $12,954 in FY 1983. Communication Security Assessment Program will not be funded in FY 1983 and out resulting in an FY 1983 decrease of $3824.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,575	7,245	19,633	25,790	Continuing	Continuing
X0668	Electromagnetic Performance of Aircraft and Ship Systems	821	1,572	5,523	3,204	Continuing	Continuing
X0705	Communication Security Assessment Program	1,562	2,063	3,784	3,824	Continuing	Continuing
X0898	Fleet Electronic Warfare Support Group	1,891	3,110	4,737	5,303	Continuing	Continuing
R1015	Electronic Warfare Master Plan	301	500	504	505	Continuing	Continuing
X1370	Counter Command, Control and Communications	0	0	5,085	12,954	Continuing	Continuing

Program Element: 24575N
DoD Mission Area: 374 - Multimission, Technology and Support

Title: Electronic Warfare Support
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATIONS FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0668	Electromagnetic Performance of Aircraft and Ships/Systems Operations and Maintenance, Navy (O&MN)	1,747	1,794	1,793	2,850	Continuing	Continuing
X0898	Fleet Electronic Warfare Support Group						
	Aircraft Procurement, Navy (APN)	16,700	20,600	36,000	15,100	Continuing	Continuing
	Other Procurement, Navy (OPN) LI 332345	3,646	7,561	6,237	2,555	Continuing	Continuing
	Operations and Maintenance, Navy (O&MN)	7,726	11,550	14,530	14,291	Continuing	Continuing

Program Element: 24575N
DoD Mission Area: 374 - Multimission, Technology and Support

Title: Electronic Warfare Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Electromagnetic Performance of Aircraft and Ship Systems provides for the development of required capabilities to measure electromagnetic emitter performance and emission control effectiveness under at-sea conditions. The equipment and techniques developed are to be utilized by Navy personnel in the EP-3A aircraft based at Naval Air Station, Patuxent River, MD. Communication Security Assessment Program

Also, it develops the capability to understand and control Battle Group surveillance vulnerability

Fleet Electronic Warfare Support Group is a separate command under Commander in Chief, U.S. Atlantic Fleet which provides a realistic environment to simulate current and predicted hostile threats during fleet exercises, tactical development and evaluation and weapons system Operational Test and Evaluation. Fleet Electronic Warfare Support Group is the nucleus of the Navy's force. Electronic Warfare Master Plan is a continuation of the Long Range Electronic Warfare Plan Project and was initiated in FY 1981. It supports planning in Electronic Warfare Areas. The Counter Command, Control and Communications Program will develop techniques to counter Soviet command, control, and communications systems.

(U) RELATED ACTIVITIES: Surface Electronic Warfare (Advanced) (PE 63521N), Surface Electronic Warfare (Engineering) (PE 64554N), Shipboard Electronic Warfare Improvements (PE 64573N), and Communications Security (PE 33401N). Related by virtue of the fact that systems developed for Fleet Electronic Warfare Support Group are used to exercise and evaluate systems developed under these program elements. Electromagnetic Performance of Aircraft and Ship Systems: This project relates in all shipboard and aircraft systems which radiate electromagnetic Energy (Radar, Communications, Electronic Warfare, etc.)

(U) WORK PERFORMED BY: Electromagnetic Performance of Aircraft and Ship Systems: Air Test and Evaluation Squadron One, Naval Air Station, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN; Naval Surface Weapons Center, Dahlgren, VA.; Contractor (To Be Determined). Communications Security Assessment Program: Naval Ocean Systems Center, San Diego, CA; Naval Intelligence Support Center, Suitland, MD: David W. Taylor Naval Ship Research and Development Center, Annapolis, MD; Naval Underwater Systems Center, New London, CT; Quest Research, McLean, VA. Fleet Electronic Warfare Support Group: Naval Avionics Center, Indianapolis, IN; Naval Surface Weapons Center, Dahlgren, VA; Naval Electronic Systems Engineering Center, Portsmouth, VA; McDonald Douglas, Tulsa, OK; Raytheon, Goleta, CA; SYSCON, Virginia Beach , VA,; Microwave Power Devices, Hauppauge, N.Y.; Logimetrics, Plainview, NY; Watkins-Johnson, San Jose, CA. Long Range Electronic Warfare Plan Project: Naval Research Laboratory, Washington D.C.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Electromagnetic Performance of Aircraft and Ship Systems: Developed techniques and software; Fleet tactical analyses software package; and antenna polarization measurement software. Modified ASA-70

display interface. Extended Instantaneous Frequency Measurement coverage and produced maintenance and operation handbooks. Improved aircraft checkout program. Commenced design of new systems. Communication Security Assessment: Hull-to-Emitter evaluation model completed. Developed specification for prototype model. Defined interfaces between Communication Security Assessment Program, operational users and intelligence/Research and Development communities. Initiated development of full Hull-to-Emitter Vulnerability Model system specification. Fleet Electronic Warfare Support Group: Initiated development of Airborne Jammer System and completed the A/B band jammer.

2. (U) FY 1982 Program: Electromagnetic Performance of Aircraft and Ship Systems: Continue FY 1981 programs expanding coverage upgrading existing avionics. Complete system engineering and system definition of new system, and commence full scale development. Communication Security Assessment: Continue FY 1981 projects to completion; stand-down project at end of FY 1982. Fleet Electronic Warfare Support Group: complete development of jammers. Commence development of jammers. Initiate development of jammer. Continue the development of simulator. Flight test the jammer in VAQ-33 Aircraft. Continue updates to Electronic Warfare Master Plan. Commence development of Counter Command, Control and Communications hardware.

3. (U) FY 1983 Planned Program: Electromagnetic Performance of Aircraft and Ship Systems: Continue selective upgrade of existing avionics. Continue development and procurement of new systems. Communication Security Assessment: Project X0705 not funded in FY 1983. Fleet Electronic Warfare Support Group: Initiate development of variants to the initial simulator. Variant simulators will address those threats not simulated in the initial simulator. Complete the development of the I/J band jammers. Complete simulator engineering model, begin acceptance testing. Transition development of Counter Command, Control and Communications Hardware, Project X1370 to program element 24576N. The decrease in Project X0668 funding is the result of major engineering development in FY 1982. The decrease in Project X0898 is the result of completing the development of the common items required for the AN/ALT-40(V), simulator in FY 1982. Project R1015, Electromagnetic Warfare Master Plan will continue to plan for out-year Electronic Warfare efforts.

4. (U) FY 1984 Planned Program: Electromagnetic Performance of Aircraft and Ship Systems: Complete new lightweight avionic system development and acquisition, complete system integration. Communication Security Assessment: Project not funded in FY 1984. Fleet Electronic Warfare Support Group: Release simulator for production at end of FY 1984. Continue development of variants to the initial simulator. Electronic Warfare Master Plan: Continue to update information and analysis.

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

6. (U) Milestones: Not Applicable.

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DEPARTMENT OF THE NAVY SUPPORTING DATA FOR FISCAL YEAR 1983 BUD--ETC(U)
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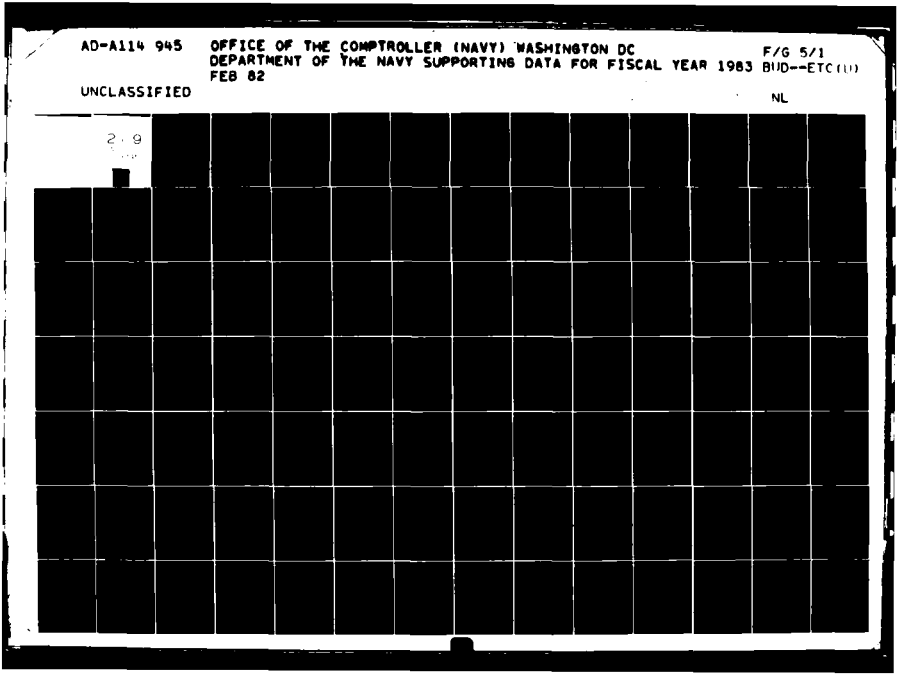

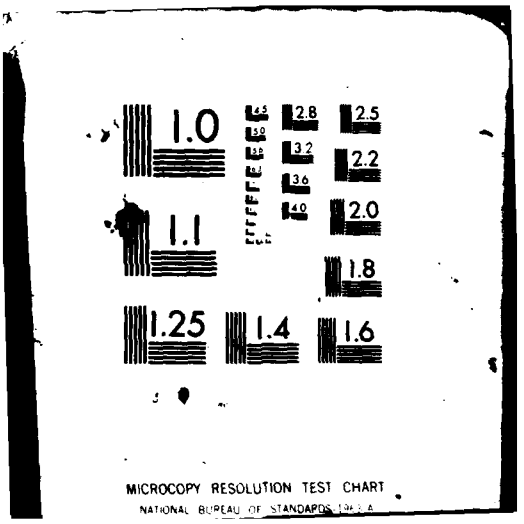
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Project: X0668
Program Element: 24575N
DoD Mission Area: 374 - Multi-Mission, Technology and Support

Title: Electromagnetic Performance of Aircraft and Ship Systems
Title: Electronic Warfare Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Electromagnetic Performance of Aircraft and Ship Systems utilizes an EP-3A aircraft equipped with special avionics to permit dynamic measurements of electromagnetic emitter performance and EMCON effectiveness under operational conditions. Present Electromagnetic Performance of Aircraft and Ship Systems avionics are overweight, plagued with reliability problems and have limited growth potential. This project provides for development of limited improvements to the present system and for the development of a new lightweight airborne system capable of meeting emitter measurement requirements through the 1980s.

(U) RELATED ACTIVITIES: This project relates to all Shipboard and Airborne systems which radiate electromagnetic energy (Radar, Communications, Electronic Warfare, etc.) by evaluating their performance as installed on their respective platforms.

(U) WORK PERFORMED BY: Contractors: To be determined. Government: Naval Surface Weapons Center, Dahlgren, VA; Naval Avionics Center, Indianapolis, IN; Air Test and Evaluation Squadron One, Naval Air Station, Patuxent River, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The present system is completing a progressive upgrade to increase its capability, operability, and availability by improving data collection and reduction software, expanding coverage to expansion of frequency coverage; selectively improving or replacing older equipment, and incorporating redundancies into those single systems critical to mission accomplishment. The preparation of requirements specifications and support documents for a measurement system was initiated in FY 1980.

2. (U) FY 1982 Program: Continue FY 1981 program extending frequency measurement capabilities to keep pace with operational and developing systems and perform systems engineering and design of a new, lightweight avionics measurement system. Begin procurement of new system components.

3. (U) FY 1983 Planned Program: Begin major procurement of components, including computer software, for the new lightweight avionics measurement system, and continue upgrade of existing system. The $1562 thousand decrease from FY 1982 to FY 1983 is the result of major engineering development efforts in FY 1982.

4. (U) FY 1984 Planned Program: Complete acquisition of new lightweight avionics system. Perform system integration, installation, and testing of the lightweight avionics measurement system. Continue system improvement in the outyears to keep pace with weapon systems introduction and maintain a goal of reducing manpower intensiveness of measurement system data collection and reduction.

Project: X0668 Title: Electromagnetic Performance of Aircraft and Ship Systems
Program Element: 24575N Title: Electronic Warfare Support
DoD Mission Area: 374 - Multi-Mission, Technology and Support Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0668	Electromagnetic Performance of Aircraft and Ship Systems	1,087	3,443	3,881	3,401	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 24576N
Title: Counter Command, Control and Communications Development
DoD Mission Area: 372 - Escort, Standoff and Counter Command Control and Communications
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	*5,011	11,533	17,900	Continuing	Continuing
X1370	Command Control and Communications Countermeasures Development	0	*5,011	11,533	17,900	Continuing	Continuing

* FY 1982 project funding is under Program Element 24575N Electronic Warfare Support.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is a continuing effort to develop countermeasures

(U) BASIS FOR FY 1983 RDT&E REQUEST: At-sea feasibility will be completed. The increase in funding (6,522) from FY 1982 reflects the transition from feasibility studies to actual hardware development and fabrication. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary in PE 24575N Electron[illegible]re Support are minus $74 in FY 1982 because of routine budget adjustments and minus 1,421 in FY 1983 because of mand[illegible]ary budget reductions and routine adjustments.

Program Element: 24576N
DoD Mission Area: 372 - Escort, Standoff and Counter Command Control and Communications

Title: Counter Command, Control and Communications Development
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
X1370	Counter Command Control and Communications	0	0	5,085*	12,954*	Continuing	Continuing

* Funded in PE 24575N Electronic Warfare Support in FY 1982.

(U) OTHER APPROPRIATION FUNDS: None

Program Element: 24576N
DoD Mission Area: 372 - Escort, Standoff and Counter Command, Control and Communications

Title: Counter Command, Control and Communications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Counter Command, Control and Communications Development project is a continuing effort to develop countermeasures

The project requires development of prototype devices for operation in the high frequency, very high frequency, ultra high frequency, and super high frequency bands. The prototype development is divided into six tasks:

(U) RELATED ACTIVITIES: Project expects to utilize communications countermeasures technology evolved over many years and offboard deception device application currently being developed under the Navy's Offboard Deception Devices Project X0849, Program Element 24573N, Navy Cover and Deception Program.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Not Applicable.

2. (U) FY 1982 Program: At-sea tests demonstrated feasibility Additional tests will examine applicability of existing hardware or experimental concepts and define prototype hardware development specifications. System requirements and design will be partially established. Initiate prototype hardware development

3. (U) FY 1983 Planned Program: Complete prototype testing. Commence development of advanced development model, advanced development model, advanced techniques advanced development model, and systems integration. Complete development of advanced development model.

4. (U) FY 1984 Planned Program: Complete evaluation of selected prototype hardware and recommend initial prototype for continued development and procurement. prototype specified. Commence development

Program Element: 24576N
DoD Mission Area: 372 - Escort, Standoff and Counter Command, Control and Communications

Title: Counter Command, Control and Communications
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Complete at-sea and ashore tests. Make appropriate recommendations for transition of each command, control, and communications device from prototype to pilot production.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25604N
DoD Mission Area: 343 - Theater Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands):

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	31,251	48,079	100,330	87,399	623,700	942,477
X0519	Joint Tactical Information Distribution System	31,251	48,079	100,330	87,399	623,700	942,477

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Existing Communications, Navigation, and Identification systems for U.S. Navy/Marine Corps tactical air and surface units are deficient. Joint Tactical Information Distribution System is an Integrated Communications, Navigation, and Identification system which will provide crypto-secure, jam-resistant, low probability of intercept communications at a high data rate, with the additional required capabilities of common-grid relative navigation, positive identification, relay, and tactical air navigation (in aircraft applications). Joint Tactical Information Distribution System will provide the electronic equipment to facilitate improved cooperative tactics and interoperability between command and control elements of all participating services. The Under Secretary of Defense (Research and Engineering) directed Navy to fund and develop a family of Distributed Time Division Multiple Access terminals, and for the Air Force and Army to fund and develop Time Division Multiple Access terminals. Air Force remains the Executive Service. The family of Distributed Time Division Multiple Access terminals is planned for installation in most Navy combatant ships and aircraft. Full scale development of the Distributed Time Division Multiple Access family of terminals is to begin in FY 1982, after approval at Defense Systems Acquisition Review Council IIB. The Distributed Time Division Multiple Access terminals will be compatible and interoperable with the Time Division Multiple Access terminals which will be deployed by the Air Force and the Army.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue full scale development of engineering development models of the Distributed Time Division Multiple Access family of terminals. Continue shipboard antenna development. Continue integration and testing for F-14 and E-2C aircraft and carriers to support the FY 1987 Initial Operational Capability. Continue integration design for remainder of designated air and surface platforms. The increase of $52,251 thousand between FY 1982 and FY 1983 integrates Joint Tactical Information Distribution System into the E-2C, F-14 aircraft and aircraft carrier and initiates the F-18 aircraft integration efforts so those platforms would be available for Operational Evaluation/Initial Operational Capability in FY 1987. The increase of funds between FY 1982 and FY 1983 is in part due to a December 1980 budget reduction across all DoD which reduced Navy Joint Tactical Information Distribution System FY 1982 funding by $18 million. During development of the FY 1983 Budget additional funds were added to FY 1983 to offset the FY 1982 reduction.

Program Element: 25604N
DoD Mission Area: 343 - Theater Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1981 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1981 Descriptive Summary and that shown in this Descriptive Summary are attributable to a Congressional decrease of $426 in FY 1981 for studies and anaylsis and a decrease of $1,287 in FY 1982 due to escalation and other Navy budget adjustments. The increase of $38,159 in FY 1983 is attributable to increased full scale development activity, increased E-2C and F-14 integration, and initiation of F-18 aircraft integration efforts. Part of the increase is to make up for lost effort in FY 1982 as a result of the December 1980 Budget reduction.

(U) FUNDING AS REFLECTED IN THE FY 1981 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	14,424	31,677	49,366	62,171	549,700	759,370
X0519	Joint Tactical Information Distribution System	14,424	31,677	49,366	62,171	549,700	759,370

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 25604N
DoD Mission Area: 343 - Theater Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Combat experience gained during the Southeast Asia conflict and Mideast incidents exposed several significant deficiencies in United States tactical communications, navigation, and identification systems. Extensive analyses of these combat situations indicate that a reliable, rapid access, high capacity, secure and jam-resistant communication link, with low probability of intercept/exploitation and execution can substantially reduce losses to hostile action. These capabilities would be critical in the hostile electronic environment envisioned for a NATO-Warsaw Pact conflict. This need to upgrade tactical communications led to the initiation of the Navy's Integrated Tactical Air Control System/Integrated Tactical Navigation System development programs to provide secure, anti-jam communication and precision relative navigation. At the same time, the Air Force was attempting similar developments through the SEEKBUS program. Both programs selected the 960-1215 MHz frequency band and employed time division multiple access techniques. The similarities between the technology being employed by both programs led the Office of the Secretary of Defense to merge these developments into a joint program. Accordingly, the Joint Tactical Information Distribution System program was established in 1974, with the Air Force as executive service. This will be an Integrated Communications, Navigation, Identification system which will provide reliable and secure, jam-resistant digital data and voice communications and precision relative navigation in support of naval air, surface, and submarine combat operations, and is interoperable with other Services and Allies using this system. Over-the-Horizon capabilities are to be provided through the use of an airborne relay inherent in the equipment. Additionally, the system will provide the Aircraft Tactical Air Navigation function. Several classes of terminals will be developed to satisfy the needs of various user platforms: A Class 1 command terminal for use on large command and control platforms (e.g., Carrier, Cruiser, Amphibious Command and Control Ships); a Class 1A for use on Airborne Early Warning aircraft and Marine Corps operations centers (e.g., E-2C, Tactical Air Operations Center); and a Class 2 tactical terminal for use on tactical aircraft and small ships (e.g., F-14, EP-3, F/A-18, LHA, FFG-7, LHDX).

(U) RELATED ACTIVITIES: Program Element 62721N, Command and Control Technology; Program Element 63511N, Air Control; Program Element 64754F, Joint Tactical Information Distribution System; Program Element 64702A, Army Joint Tactical Information Distribution System; Program Element 63713A, Army Joint Tactical Information Distribution System hybrid with Position Location Reporting System; Program Element 26313M, Project C0053, Marine Corps Joint Tactical Information Distribution System.

(U) WORK PERFORMED BY: In House: Naval Air Development Center, Warminster, PA; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA. Contractors: ITT Avionics Division, Nutley, NJ; Singer Kearfott Division, Little Falls, NJ; Hughes Aircraft Company, Fullerton, CA; IBM Federal Systems Division, Owego, NY; Grumman Aerospace, Bethpage, NY; McDonnell Douglas Aircraft Corporation, St. Louis, MO.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Time Division Multiple Access Class 2 tactical advanced development model terminals were bench tested, systems laboratory tested and flight tested. System laboratory and flight tests were reduced in scope because of Congressional reduction of funds in FY 1980 ($3.4 million for Navy). Results of this limited testing met specification

Program Element: 25604N
DoD Mission Area: 343 - Theater Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: 4 - Tactical Programs

requirements. Contractor test and evaluation of Distributed Time Division Multiple Access command and tactical advanced development model terminals met or exceeded specification requirements. The results of this study will become part of the Engineering Development Model specifications. The Request for Proposal for the full scale development of the Distributed Time Division Multiple Access technology was released in March 1981. Source selection activities began in July 1981. Contract award is scheduled for FY 1982 following Defense System Acquisition Review Council IIB.

2. (U) FY 1982 Program: Complete the design analysis and commonality studies for the Distributed Time Division Multiple Access architecture. Conduct Defense System Acquisition Review Council IIB in the first quarter FY 1982 for full scale development decision. Award the full scale development contract in the first quarter of FY 1982. Continue development of system interfaces and implementation plans. Continue integration work. Continue planning and analysis for logistics support factors, including maintainability, reliability and life-cycle cost trade-offs. Continue efforts to obtain frequency allocation for the Distributed Time Division Multiple Access waveform.

3. (U) FY 1983 Planned Program: Continue the full scale development of the Distributed Time Division Multiple Access technology. Continue analysis for logistics support to include maintainability, reliability and life cycle costing tradeoffs. Continue interface development and aircraft and ship modification designs for carrier, E-2C, and F-14. Commence laboratory preparation for testing of full scale development terminals. Commence preparation for technical and operational evaluation of the family of Distributed Time Division Multiple Access terminals. Develop documentation required for Joint Tactical Information Distribution System fleet introduction. Continue efforts to obtain a stage 4 frequency allocation. Continue development of integration planning.

4. (U) FY 1984 Planned Program: Receive Block 1 delivery of full scale development terminals. Commence laboratory testing of full scale development terminals. Integrate Class 1A Distributed Time Division Multiple Access terminals in the E-2C and the Class 2 terminal in the F-14 for contractor flight testing. Continue preparation for technical and operational testing of the family of Distributed Time Division Multiple Access terminals. Continue documentation development for fleet introduction of Joint Tactical Information Distribution System. Continue development of integration designs for designated Joint Tactical Information Distribution System platforms. Continue efforts to obtain a stage 4 frequency allocation.

5. (U) Program to Completion: Complete development with appropriate hardware/software modifications of first system prototype. Complete integration plans for other host designated platforms. Complete operational test and evaluation of engineering development model equipment to include interoperability, weapon control functions, and backward compatibility with Time Division Multiple Access terminals. Obtain STAGE 4 frequency allocation. Obtain approval for service use. Finalize logistic support requirements. Refine Net Management concepts, as necessary, to meet evolving Joint Tactical Information Distribution System joint service requirements for tactical command and control nets.

Program Element: 25604N
DoD Mission Area: 343 - Theater Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	MILESTONE		DATE
1.	Award Contract(s) for Design Studies		January 1981
2.	Release request for proposal for Full Scale Development of Distributed Time Division Multiple Access Terminals		March 1981
3.	Complete Bench, Systems, Laboratory, and Flight Testing of Distributed Time Division Multiple Access Advanced Development Terminals		August 1981
4.	Defense Systems Acquisition Review Council IIB Distributed Time Division Multiple Access Terminals	*(September 1981)	January 1982
5.	Full Scale Development Contract(s) Award	*(November 1981)	January 1982
6.	Complete Design Studies	*(July 1981)	January 1982
7.	Block 1 Engineering Development Model Terminals Delivered		
8.	Initial Operational Capability		
9.	Defense Systems Acquisition Review Council III (Production Decision)		

* Dates shown in FY 1982 Program Element Descriptive Summary. Milestone changes resulted from deferral of FY 1981 funds.

Program Element: 25604N
DoD Mission Area: 343 - Theater Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: (a) Program Management Reviews/Decisions: The Navy's Integrated Tactical Navigation System and Air Force's SEEKBUS program were combined into the Joint Tactical Information Distribution System in 1974, by the Under Secretary of Defense (Research and Engineering). As a part of the Joint Program Office, Navy released contracts to develop both the Time Division Multiple Access technology and the Distributed Time Division Multiple Access technology. Program guidance issued by the Under Secretary of Defense (Research and Engineering) in July 1980, assigned Navy the responsibility for funding, management, and development of the Distributed Time Division Multiple Access technology while the Air Force retains responsibility for the Time Division Multiple Access technology. The technologies will be compatible and interoperable in a joint Service environment in a Time Division Multiple Access mode. Navy developmental testing of both the Time Division Multiple Access technology and Distributed Time Division Multiple Access technology has been completed. Defense Systems Acquisition Review Council IIA was held in January 1981, and the Air Force and Army has begun full scale development of the Time Division Multiple Access technology. Test results for the Distributed Time Division Multiple Access technology were satisfactory, test reports are being prepared, and Defense Systems Acquisition Review Council IIB is planned for January 1982. Navy full scale development of the Distributed Time Division Multiple Access technology is planned to begin in January 1982. (b) Joint Testing: A Joint Test and Evaluation Master Plan is being developed. (c) Future Development, Test and Evaluation: Developmental testing two will be conducted in 1984, after delivery of the full scale development Distributed Time Division Multiple Access terminals. Navy testing will be conducted as specified in the Joint Test and Evaluation Master Plan (J-357). Joint testing will be conducted as specified in the Joint Test and Evaluation Master Plan and as directed in the Navy Test and Evaluation Master Plan. (d) Several of the major items covered are as follows: Bench test results, and the results from the Design Analysis and Commonality contract will be factored into the full scale development model terminals. Systems laboratory test results have proved the validity of the Distributed Time Division Multple Access technology concept to support current and future Navy requirements. Compatibility and interoperability with automated tactical data systems, Link 11, Link 4A, and voice have been demonstrated. (e) Contractor: The contractor for the full scale development of the Distributed Time Division Multiple Access terminals has been selected and contract award for full scale development of the Distributed Time Division Multiple Access terminals was signed January 1982.

2. (U) Operational Test and Evaluation: (a) Operational Testing to Date: Operational testing to date has concluded that the Joint Tactical Information Distribution System has the potential to be operationally effective and suitable. Operational Testing was conducted with terminals interfaced with laboratory fleet combat direction system equipment, and a P-3A aircraft with an installed terminal operated by fleet experienced personnel. Electronic countermeasures threat simulators were used to realistically stress the Joint Tactical Information Distribution System in representative threat scenarios. Based on operational testing to date, Distributed Time Division Multiple Access terminals are recommended to proceed to full scale development by the Commander, Operational Test and Evaluation Force, with recommendations to improve operational effectiveness and suitablity through more emphasis on software development, improved TACAN function implementation, improved reliability and availability of voice and data

function channels, and by incorporating an increased built-in test capablity for real-time performance monitoring. (b) Future Operational Test and Evaluation: Operational test personnel will assess operational effectiveness and suitability of the Joint Tactical Information Distribution System in an operational environment. During this phase, the Joint Tactical Information Distribution System engineering development model terminals will be operated and maintained by fleet personnel with limited contractor support. Training, manning, and logistic support philosophies will be in the advanced stages of development. Reliability, maintainability, logistic supportablity and compatibility will also be evaluated. Electronic countermeasures assets will be scheduled for operational testing to realistically stress the Joint Tactical Information Distribution System in representative threat scenarios.

3. (U Distributed Time Division Multiple Access

System Characteristics	Goal	Thresholds
Maximum Users		
Unformatted Data Rate (1 Net)		
Formatted Data Rate (1 Net)		
Anti-Jam Margin of Basic Data Link		
Range		
TOA Ranging Accuracy		
Relay Range		
Maximum Inndependent Simultaneous Nets		
Interoperability		

* MER (Message Error Rate).

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25620N
Title: Anti-Submarine Warfare Combat System Integration
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	14,184	20,866	16,135	14,589	36,510	119,968
S0896	Anti-Submarine Warfare Combat System Integration	14,184	20,866	16,135	14,589	36,510	119,968

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Introduction of the AN/SQQ-89(V), Underwater Sensor Suite (composed of the AN/SQR-19 Tactical Towed Array Sonar, the AN/SQS-53B Surface Ship Sonar, and the Lightweight Airborne Multi-Purpose System MK III Acoustic Processor (AN/SQQ-28) systems) in surface ships will generate large numbers of passive and active contacts. An integrated ASW Control System is required to effectively correlate, classify, track, etc., contacts. This program develops sensor integration and display sharing software applicable to and a computer-based Anti-Submarine Warfare Control System applicable. Timely development of the Anti-Submarine Warfare Control System is essential to ensure the effective utilization of new sensor systems. Without such an automated system, experience has shown that only In order to ensure that the ship construction and backfit installation schedules are met for the Anti-Submarine Warfare Control System and new sensor systems, Anti-Submarine Warfare Control System will be developed in two phases: Models 1.0 and 2.0. Model 1.0 will be evaluated concurrently with AN/SQS-53B and will support its at-sea operational evaluation. Experience gained with Model 1.0 will be incorporated in Model 2.0 which will undergo additional operational test and evaluation and will interface with all three new sensor systems. Model 2.0 is a software only upgrade; the hardware baseline will be established with Model 1.0.

(U) BASIS FOR FY 1983 RDT&E REQUEST: AN/SQQ-89(V) three-sensor (AN/SQQ-28//AN/SQS-53//AN/SQR-19) display allocation testing will be conducted at the Land-Based Integrated Test Site, Naval Underwater Systems Center, New London, concurrent with development of operational guidelines. Development of Anti-Submarine Warfare Control System Model 2.0 software and the supporting DD-963 combat direction system program will continue. Software design changes to Model 2.0 will be underway to support hardware and interface differences between combat systems. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 25620N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Combat System Integration
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary result in an increase in total estimated cost of $17,964. The total estimated cost shown in FY 1982 Descriptive summary was $8,369 below true estimated figure due to previous year inaccuracies. The FY 1982 total estimated cost should have been $110,373. The decreases of 271 in FY 1981, 816 in FY 1982, 197 in FY 1983 are due to cost escalation decreases and budget adjustments. The real increase in total estimated cost of 9,595 is due to inclusion of the Anti-Submarine Warfare Combat System requirements associated with [redacted] combat systems.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,854	14,455	21,682	16,332	40,220	102,004
S0896	Anti-Submarine Warfare Combat System Integration	8,854	14,455	21,682	16,332	40,220	102,004

(U) OTHER APPROPRIATIONS FUNDS: (Dollars in Thousands).

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN				44,679	158,249	203,538
Quantity				(10)	(39)	(49)

O&MN and SCN funding has been requested for [redacted] ship classes.

Program Element: 25620N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Combat System Integration
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Acoustic sensor integration efforts were initiated during FY 1976 under Program Element 25623N, Surface Ship Modernization, to define an approach for sharing common hardware. These efforts provided a basis for developing integration to make maximum use of the increased quantity and quality of target data which will be available from anti-submarine warfare surface ship sensors currently in development, i.e., AN/SQR-19 tactical towed array sonar, Light Airborne Multi-Purpose System (LAMPS) MK III, and the AN/SQS-53B sonar. These studies have resulted in the definition of a display sharing development effort which provides for a reduction in the number of sensor system display consoles (from 5 to 4) required for the conduct of coordinated multi-sensor operations. The need to manage, classify, and correlate vast quantities of contact data which will be generated by the new or improved sensor systems resulted in the definition of the MK 116 Mod 5/6 Underwater Fire Control system (Anti-Submarine Warfare Control System) to provide necessary computer and display resources for passive data management while interfacing with, but having minimal functional impact on the Combat Direction System programs.

(U) RELATED ACTIVITIES: Program Element 64212N, Project W0474, Light Airborne Multi-Purpose System MK III - Development of an Anti-Submarine Warfare helicopter for deployment from surface ships. Program Element 64713N, Project S0234, Tactical Towed Array Sonar - Development of towed array sonars for surface ship tactical use. Program Element 63553N, Project S0220 Advanced Surface Ship Sonar (Cancelled in FY 1982) - Development of rapid passive localization techniques for surface ship applications. Program Element 25623N, Project S0217, AN/SQS-53B Sonar Improvement - Modernization of the surface ship hull mounted AN/SQS-53 sonar. Program Element 64518N - Anti-Submarine Warfare Tactical Display System for FF 1052 class ships. Program Element 63708N - Acoustic Performance Prediction MK 116 MOD 4 Underwater Fire Control System.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC; Naval Underwater Systems Center, New London Laboratory, New London, CT (AN/SQQ-89 Technical Direction Agent); Naval Ocean Systems Center, San Diego, CA (ASW Control System Design Agent). Contractors: EG&G Hydrospace Challenger Group, Rockville, MD; Tracor, Inc., Rockville, MD; Hughes Aircraft Company, Fullerton, CA; General Electric Company, Syracuse, NY; Science Application Incorporated, San Diego, CA; Sperry-Univac, Minneapolis, MN; Systems Consultants Inc., San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Required interfaces were defined between the ASW control system and the AN/SQR-19 Tactical Towed Array Sonar, AN/SQQ-28 Light Airborne Multi-Purpose System MK III shipboard system, the AN/SQS-53B sonar system, combat direction system and Design of ASW Control System model 1.0 was completed and software development initiated. System design of model 2.0 commenced. Installation arrangements to accommodate the concurrent at-sea evaluations of AN/SQR-19, AN/SQS-53B, Anti-Submarine Warfare combat system Model 1.0 and the Combat Direction System were accomplished. The development of simulators for the AN/SQS-53B and AN/SQQ-28 Land Based Integration Test Site system was completed. AN/SQQ-89 operability studies were completed. was completed.

Program Element: 25620N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Combat System Integration
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Complete Model 2.0 system design and procure required government-furnished equipment hardware to upgrade test sites. Complete installation of Model 1.0 Anti-Submarine Warfare Control System integrate with AN/SQS-53B and combat direction system and conduct at-sea operational testing. Request approval for service use for ASW Control System Model 1.0. Complete development of AN/SQR-19 and for land-based integration test site. Issue initial AN/SQQ-89 operational guidelines. Perform two-sensor display sharing integrated test and evaluation at Land Based Integration Test Site.

3. (U) FY 1983 Planned Program: Obtain Anti-Submarine Warfare Control System model 1.0 approval for service use and initiate life-cycle support phase for Model 1.0 system. Continue Anti-Submarine Warfare Control System Model 2.0 software development and certify land based test site operational/simulation capabilities. Issue AN/SQQ-89 operational guidelines. Perform three-sensor AN/SQQ-89 operability test and evaluation at land based integration test site.

4. (U) FY 1984 Planned Program: Complete acceptance testing of Anti-Submarine Warfare Control System Model 2.0 software and deliver to combat system test sites. Verify integration of Anti-Submarine Warfare Control System Model 2.0 software and hardware with combat direction system and AN/SQQ-89 systems in test sites representing class combat systems.

5. (U) Program to Completion: Install Anti-Submarine Warfare Control System Model 2.0 capability to support integrated Anti-Submarine Warfare Combat System operational testing. Control Anti-Submarine Warfare Control System Model 2.0 software operational evaluation with full AN/SQQ-89 sensor capabilities and begin ASW Control System (ASWCS) installations on concurrent with installation of AN/SQR-19, AN/SQS-53B and AN/SQQ-28 systems. Initiate Anti-Submarine Warfare Control System Model 2.0 life cycle support. Maintain the AN/SQQ-89 baseline system at land based integration test site. Integrate Anti-submarine Warfare combat system training capabilities with AN/SQQ-28, AN/SQR-19, and AN/SQS-53B training, resulting in Anti-Submarine Warfare combat system/AN/SQQ-89 integrated shore trainers.

6. (U) Milestones: Not Applicable

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25623N
Title: Surface Ship Sonar Modernization
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	19,151	13,973	8,003	9,942	Continuing	Continuing
S0217	AN/SQS-53B	19,151	13,973	6,013	5,775	Continuing	Continuing
S1595	AN/SQR-19 Improvement	-	-	-	1,765	Continuing	Continuing
S1637	AN/SQS-26 Improvement	-	-	1,990	2,402	34,273	38,665

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The AN/SQS-53 Improvement Program is modernizing the AN/SQS-53 (series) sonars currently installed, or scheduled to be installed, in over sixty of the Navy's most modern battle group escorts through a series of preplanned product improvements. Phase 1 of this program results in the AN/SQS-53A being redesignated the AN/SQS-53B. This modernization will improve system performance, reliability and operability through replacement of existing analog displays which are difficult to operate and maintain, and will permit integration of AN/SQS-53 sonar data with that of the AN/SQR-19 Tactical Towed Array Sonar (TACTAS) and Light Airborne Multi-Purpose System (LAMPS) MK III in the AN/SQQ-89(V) Underwater Sensor System which is being integrated under Program Element 25620N (Anti-Submarine Warfare Combat System Integration). The AN/SQR-19 Improvement Program will improve AN/SQR-19 Tactical Towed Array Sonar performance and maintainability and will ensure that the system adapts to the emergent threat, is upgraded to Navy standard building block components, implements newly and other performance improvements. The AN/SQS-26 upgrade program will provide both a system reliability improvement and subsystem performance improvement, not scheduled to receive the more extensive AN/SQS-53 improvement program modernizaton changes. These changes will encompass numerous improvements and technology modernization which will result in increased system performance, operability, reliability and maintainability.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0217 AN/SQS-53B: The FY 1983 program will fund the correction of deficiencies identified in FY 1982 test and evaluation, in final preparation for full scale initial production. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only. Project S1637 AN/SQS-26 Improvement: The FY 1983 program will initiate and complete design definition and initiate the development phase of the broadband improvement portion of this project. The above funding profile, for Project S1637, includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 25623N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Ship Sonar Modernization
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflect a $285 decrease in FY 1981 due to revised escalation/inflation factors; a $496 decrease in FY 1982 due to revised inflation/escalation factors ($214) and a reduction for consultants, studies and analyses ($282); and an increase of $4,631 in FY 1983 due to an increase of $2,371 for program restructuring for the AN/SQS-53B to include interface and integration with subsequent developmental phases beyond the AN/SQS-53B and $1,990 for the start of the AN/SQS-26 project.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	21,821	19,436	14,469	3,642	Continuing	Continuing
S0217	AN/SQS-53B Sonar Improvement	21,821	19,436	14,469	3,642	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN AN/SQS-53B	0	0	0	60,441	290,559	351,000
Quantity				(6)	(67)	(73)
SCN AN/SQS-53B	0	12,652	18,978	18,978	88,561	139,169
Quantity		(2)	(2)	(3)	(15)	(22)
OPN AN/SQS-26	0	0	8,705	9,361	TBD	TBD

Program Element: 25623N
Title: Surface Ship Sonar Modernization
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project S0217 AN/SQS-53B: The AN/SQS-53 (series) sonar will be the principal anti-submarine warfare sensor for more than sixty of the Navy's most modern battle group escorts. This sonar provides long-range submarine detection, classification, localization, and tracking under various environmental conditions using direct (surface duct), bottom-reflected, or convergence zone acoustic paths. However, since the AN/SQS-53 sonar is, in effect, an AN/SQS-26CX sonar with a modified digital fire control interface, it uses outmoded electronic technology dating from the early 1960's. By current standards, the AN/SQS-53 sonar system is deficient in performance under unfavorable environmental conditions and is difficult to maintain because of the requirement for numerous, time-consuming, and complex adjustments which contribute to poor system performance. The sonar exceeds size and weight requirements of the CG-47 [redacted] demands an excessive number of operators, and is not directly compatible with modern digital Combat Directions Systems or new acoustic sensor and weapon control systems under development. This modernization effort will improve sonar operability and maintainability through use of modern digital technology. A stand-alone passive narrowband detection/tracking capability will be provided which will double the amount of area which can be covered and eliminate the dependence on other sensors for narrowband processing. Active detection and classification will be improved by additional processing gain, increased coverage, improved/colocated display formats and independent search and track capability. Shipboard space, weight, and manpower requirements will be reduced by employing modular construction and packaging. This modernization effort is required to ensure AN/SQS-53 integrability with the AN/SQR-19 Tactical Towed Array Sonar and Light Airborne Multi-Purpose System MK III in the AN/SQQ-89(V)1 Underwater Sensor System and advanced Anti-Submarine Warfare suite being developed separately. It will further ensure the ability of the AN/SQS-53 to interface with the planned ASW Control System (an active/passive fire control and contact classification/management system). [redacted] This effort will incorporate standard Navy AN/UYK-44 computers, AN/UYQ-21 acoustic display consoles, and [redacted] necessary interface equipment. This emphasis on general purpose digital architecture will permit full sonar integration with new acoustic sensor and command and control systems. Two engineering development models have been fabricated: one is being used for testing at the Land Based Integration and Test Site at the Naval Underwater Systems Center, New London, and one is being installed for testing on board the [redacted] S1595 AN/SQR-19 Improvements: The AN/SQR-19 Tactical Towed Array Sonar will be the foremost towed array in the world and will be capable of detecting Soviet submarines [redacted] It will be installed in [redacted] and provide a quantum improvement to their ASW capability. Certain improvements to the AN/SQR-19 are necessary to adapt to the current and projected threat and to upgrade components to new versions and/or configurations. The result will be significantly improved performance as well as system reliability and maintainability. S1637 AN/SQS-26 Improvement: The AN/SQS-26CX sonar is the principal anti-submarine warfare sensor for [redacted] the Navy's FF-1052 and CGN-36 class ships, most of which will be in the active fleet through the late 1990's and beyond. The sonar provides long-range submarine detection, classification, localization, and tracking under various environmental conditions using direct path (surface duct), bottom-reflected, or convergence zone acoustic paths. Although the AN/SQS-26CX is a highly capable sonar, it incorporates outmoded electronic technology dating from the early 1960's. By current standards, the AN/SQS-26CX sonar is deficient in performance under unfavorable environmental conditions and is difficult to maintain because of the requirement for numerous, time-consuming, and complex adjustments which contribute to poor system performance.

Program Element: 25623N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Ship Sonar Modernization
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: Program Element 64518N, Project S0251-CC, CIC Conversion/Data Display System - Development of standard surface ship data display consoles. Program Element 64212N, Project W0474, Light Airborne Multi-Purpose System MK III - Development of Anti-Submarine Warfare helicopter for deployment from surface ships. Program Element 64713N, Project S0234, Tactical Towed Array Sonar - Development of towed array sonars for surface ship tactical use. Program Element 25620N, Project S0896, Anti-Submarine Warfare Combat System Integration - Development of an integrated anti-submarine warfare control system for coordinated employment of anti-submarine warfare sensor, fire control, and acoustic warfare systems. Program Element 63589N, DDGX, funds initial start of AN/SQS-53 Phase 2 (AN/SQS-53C).

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London Laboratory, New London, CT (lead laboratory); Naval Sea Systems Detachment, Norfolk, VA (In-Service Engineering Agent). Contractors: Hughes Aircraft Company, Fullerton, CA; General Electric Company, Syracuse, NY; CID/Gould, Glen Burnie, MD; Sperry-Univac, Saint Paul, MN; EG&G Rockville, MD; TRACOR, Austin, TX and Groton, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0217 AN/SQS-53B: The program was inititated in FY 1974 with the installation of an AN/SQS-26CX sonar receiver/display subsystem in the Land Based Integration and Test Site at the Naval Underwater Systems Center, New London Laboratory. Early efforts resulted in the definition of hardware requirements and system controller and display software. Four Navy standard AN/UYK-20 computers have been installed at the Naval Underwater Systems Center, New London Laboratory, for use either as system controllers or in the new operational software development laboratory. Two more AN/UYK-20s have been procured as government furnished equipment for the full scale development contractor. The system description and prime item development specification have been published. Two sets of AN/UYK-20 computers, mass memory units, and standard display consoles have been procured. One set has been installed at the Land Based Integration and Test Site and one set has been provided as government furnished equipment to the full scale development contractor. The Naval Underwater Systems Center, New London Laboratory, completed appropriate interface hardware design and fabricated a laboratory model. Software development has progressed to the point that display of formats for the AN/UYQ-21 consoles are complete. Coordinated Light Airborne Multi-Purpose System MK III, AN/SQS-26(CX), and AN/SQR-18 Tactical Towed Array sonar tests were conducted at sea using with results leading to completion of preliminary sensor integration studies. During FY 1980, a program decision was made to change over to the more capable new Navy standard AN/UYK-44 computers currently under development. In the interim, AN/UYK-44 emulators have been procured and integrated for use during full scale development. Special software tests have been successfully conducted that demonstrate full software transportability to the new Navy standard AN/UYK-44 computers planned for use in initial production phase of AN/SQS-53B. Full scale development efforts for software demonstration and certification at the Land Based Integration and Test Site were completed using Naval Underwater

System Center-developed hardware. Required factory engineering development testing was completed, and engineering development model testing was completed. System integration tests commenced at the Land Based Integration and Test Site. Integrated Logistics Support effort will continue. Detailed planning for engineering development model shipboard installation for Technical/Operational Evaluation was completed and shipboard installation in commenced. Configuration management planning was begun to establish a production baseline.

2. (U) FY 1982 Program: S0217 AN/SQS-53B: Shipboard installation and all test and evaluation including technical and operational evaluations, will be completed and a request for approval for service use will be prepared for processing.

3. (U) FY 1983 Planned Program: S0217 AN/SQS-53B: Approval for service use (ASU) will be granted. Subsequent to approval for service use, conversion of applicable computer software from ULTRA-16 assembly language to Navy Standard High Order language (CMS-2M) is planned. Incorporation of changes required as a result of test and evaluation will begin in preparation for initial production. S1637 AN/SQS-26 Improvement: The program will initiate design definition of broadband passive improvements to the AN/SQS-26(CX) sonar.

4. (U) FY 1984 Planned Program:: S0217 AN/SQS-53B: Completion of changes required for initial production will occur, as will interface implementation to facilitate a smooth and orderly transition to Phase II of the AN/SQS-53 Improvement program (AN/SQS-53C). S1637 AN/SQS-26 Improvement: The project will complete design definition and initiate the development phase of the program. S1595 AN/SQR-19 Improvements: The program will complete design definition, conduct cost/benefit trade off-studies and initiate full scale development phase.

5. (U) Program to Completion: S0217 AN/SQS-53B: Complete transition to Phase II of the AN/SQS-53 Improvement program (AN/SQS-53C). Initial operational capability will be attained for the AN/SQS-53B S1637 AN/SQS-26 Improvement: Completion of development of engineering changes and of test and evaluation. Begin procurement. S1595 AN/SQR-19 Improvement: Completion of development of engineering changes and of test and evaluation. Begin procurement.

6. (U) Milestones: Not applicable.

Project: S0217
Program Element: 25623N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: AN/SQS-53B
Title: Surface Ship Sonar Modernization
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project S0217 AN/SQS-53B: The AN/SQS-53 (series) sonar will be the principal anti-submarine warfare sensor for more than sixty of the Navy's most modern battle group escorts. This sonar provides long-range submarine detection, classification, localization, and tracking under various environmental conditions using direct (surface duct), bottom-reflected, or convergence zone acoustic paths. However, since the AN/SQS-53 sonar is, in effect, an AN/SQS-26CX sonar with a modified digital fire control interface, it uses outmoded electronic technology dating from the early 1960's. By current standards, the AN/SQS-53 sonar system is deficient in performance under unfavorable environmental conditions and is difficult to maintain because of the requirement for numerous, time-consuming, and complex adjustments which contribute to poor system performance. The sonar exceeds size and weight requirements of the CG-47] demands an excessive number of operators, and is not directly compatible with modern digital Combat Directions Systems or new acoustic sensor and weapon control systems under development. This modernization effort will improve sonar operability and maintainability through use of modern digital technology. A stand-alone passive narrowband detection/tracking capability will be provided which will double the amount of area which can be covered and eliminate the dependence on other sensors for narrowband processing. Active detection and classification will be improved by additional processing gain, increased coverage, improved/colocated display formats and independent search and track capability. Shipboard space, weight, and manpower requirements will be reduced by employing modular construction and packaging. This modernization effort is required to ensure AN/SQS-53 integrability with the AN/SQR-19 Tactical Towed Array Sonar and Light Airborne Multi-Purpose System MK III in the AN/SQQ-89(V)1 Underwater Sensor System and advanced Anti-Submarine Warfare suite being developed separately. It will further ensure the ability of the AN/SQS-53 to interface with the planned ASW Control System (an active/passive fire control and contact classification/management system)] class ships. This effort will incorporate standard Navy AN/UYK-44 computers, AN/UYQ-21 acoustic display consoles, and necessary interface equipment. This emphasis on general purpose digital architecture will permit full sonar integration with new acoustic sensor and command and control systems. Two engineering development models have been fabricated: one is being used for testing at the Land Based Integration and Test Site at the Naval Underwater Systems Center, New London, and one is being installed for testing on board the

(U) RELATED ACTIVITIES: Program Element 64518N, Project S0251-CC, CIC Conversion/Data Display System - Development of standard surface ship data display consoles. Program Element 64212N, Project W0474, Light Airborne Multi-Purpose System MK III - Development of Anti-Submarine Warfare helicopter for deployment from surface ships. Program Element 64713N, Project S0234, Tactical Towed Array Sonar - Development of towed array sonars for surface ship tactical use. Program Element 25620N, Project S0896, Anti-Submarine Warfare Combat System Integration - Development of an integrated anti-submarine warfare control system for coordinated employment of anti-submarine warfare sensor, fire control, and acoustic warfare systems. Program Element 63589N, DDGX - funds initial start of AN/SQS-53 Phase 2 (AN/SQS-53C).

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London Laboratory, New London, CT (lead laboratory); Naval Sea Systems Detachment, Norfolk, VA (In-Service Engineering Agent). Contractors: Hughes Aircraft Company, Fullerton, CA; General Electric Company, Syracuse, NY; EG&G Rockville, MD; TRACOR, Austin, TX and Groton, CT.

Project: S0217
Program Element: 25623N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: AN/SQS-53B
Title: Surface Ship Sonar Modernization
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (C) FY 1981 and Prior Accomplishments: S0217 AN/SQS-53B: The program was inititated in FY 1974 with the installation of an AN/SQS-26CX sonar receiver/display subsystem in the Land Based Integration and Test Site at the Naval Underwater Systems Center, New London Laboratory. Early efforts resulted in the definition of hardware requirements and system controller and display software. Four Navy standard AN/UYK-20 computers have been installed at the Naval Underwater Systems Center, New London Laboratory, for use either as system controllers or in the new operational software development laboratory. Two more AN/UYK-20s have been procured as government furnished equipment for the full scale development contractor. The system description and prime item development specification have been published. Two sets of AN/UYK-20 computers, mass memory units, and standard display consoles have been procured. One set has been installed at the Land Based Integration and Test Site and one set has been provided as government furnished equipment to the full scale development contractor. The Naval Underwater Systems Center, New London Laboratory, completed appropriate interface hardware design and fabricated a laboratory model. Software development has progressed to the point that display of formats for the AN/UYQ-21 consoles are complete. Coordinated Light Airborne Multi-Purpose System MK III, AN/SQS-26(CX), and AN/SQR-18 Tactical Towed Array sonar tests were conducted at sea using with results leading to completion of preliminary sensor integration studies. During FY 1980, a program decision was made to change over to the more capable new Navy standard AN/UYK-44 computers currently under development. In the interim, AN/UYK-44 emulators have been procured and integrated for use during full scale development. Special software tests have been successfully conducted that demonstrate full software transportability to the new Navy standard AN/UYK-44 computers planned for use in initial production phase of AN/SQS-53B. Full scale development efforts for software demonstration and certification at the Land Based Integration and Test Site were completed using Naval Underwater System Center-developed hardware. Required factory engineering development testing was completed, and engineering development model testing was completed. System integration tests commenced at the Land Based Integration and Test Site. Integrated Logistics Support effort will continue. Detailed planning for engineering development model shipboard installation for Technical/Operational Evaluation was completed and shipboard installation in commenced. Configuration management planning was begun to establish a production baseline.

2. (U) FY 1982 Program: S0217 AN/SQS-53B: Shipboard installation and all test and evaluation including technical and operational evaluations, will be completed and a request for approval for service use will be prepared for processing.

3. (U) FY 1983 Planned Program: S0217 AN/SQS-53B: Approval for service use (ASU) will be granted. Subsequent to approval for service use, conversion of applicable computer software from ULTRA-16 assembly language to Navy Standard High Order language (CMS-2M) is planned. Incorporation of changes required as a result of test and evaluation will begin in preparation for initial production.

Project: S0217 Title: AN/SQS-53B
Program Element: 25623N Title: Surface Ship Sonar Modernization
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program:: S0217 AN/SQS-53B: Completion of changes required for initial production will occur, as will interface implementation to facilitate a smooth and orderly transition to Phase II of the AN/SQS-53 Improvement program (AN/SQS-53C).

5. (U) Program to Completion: S0217 AN/SQS-53B: Complete transition to Phase II of the AN/SQS-53 Improvement program (AN/SQS-53C). Initial operational capability will be attained for the AN/SQS-53B

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0217	AN/SQS-53B	19,151	13,973	6,013	5,775	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25624N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: AN/SQR-18 Tactical Towed Array Sonar
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,380	6,611	4,939	4,645	Continuing	Continuing
S1351	AN/SQR-18 Tactical Towed Array Sonar	5,380	6,611	4,939	714	0	17,644
	Quantity	(DT&E/FOT&E)	(DT&E/FOT&E)	(DT&E/FOT&E)			(3)
S1646	AN/SQR-18 Operability Improvement	0	0	0	3,931	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Congress directed the continued improvement of the AN/SQR-18A as a condition for releasing the AN/SQR-19 from the requirement to compete its development contract. This program complies with the Congressional direction. S1351: This project will modify the AN/SQR-18A Tactical Towed Array Sonar to replace the array with an improved version. It will also develop an interface with the AN/SQR-19 Hoist to permit installation on non-variable depth sonar platforms to allow these platforms to join other towed array platforms in an appropriate force mix in support of surface ASW missons (i.e., convoy escort, barrier patrol, etc.). These platforms comprise and it is therefore necessary that they achieve their full ASW capability. S1646: This project will develop selected low-cost, high-payoff operational and performance improvements that have been recommended by the fleet and/or have become available through various advanced development efforts. In particular, this project will provide a in the Combat Information Center.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The non-variable depth sonar platform version factory testing will be completed and documentation development will be initiated. Engineering development model installation follow-on test and evaluation will be conducted. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive Summary result from the following: S1351: (1) the $155 reduction in FY 1981 reflects a downward revision in the inflation rate, (2) the $163 decrease in FY 1982 is due to a reduction in inflation indicies, (3) and the $1,847 increase in FY 1983 reflects revised cost estimates to complete the currently structured program; S1646: New start in FY 1984.

Program Element: 25624N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: AN/SQR-18 Tactical Towed Array Sonar
Budget Activity: 4 - Tactical Programs

Project No.	Title	Total FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	5,535	6,774	3,092	767	16,168
S1351	SQR-18 Tactical Towed Array Sonar	0	5,535	6,774	3,092	767	16,168

( ) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	10,343	2,493	16,677	19,157	82,426	132,096
(Quantity) (Array Backfit/Non-Variable Depth Sonar)			(15/0)	(23/0)	(0/12)	(38/12)

Program Element: 25624N
Title: AN/SQR-18 Tactical Towed Array Sonar
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S1351: The AN/SQR-18A is currently being installed on FF-1052 Class ships with [redacted] Installations will be completed [redacted] In FY 1978, the Navy changed earlier plans to install the AN/SQR-19 on FF-1052's [redacted] based on projections of system cost and platform life. Therefore, [redacted] was planned for these ships which will be primary ASW vehicles for the next 20 years. The House of Representatives' Committee on Appropriations letter of 15 March 1979 granted approval of the Navy's request to drop the requirement for competition of the AN/SQR-19 development contract with the condition that effort be continued to improve the AN/SQR-18 system as a backup. There was thus a twofold requirement for an AN/SQR-18A: to provide a backup for the AN/SQR-19 and to provide a cost-effective towed array capability for [redacted] and enable them to attain their full ASW potential. The AN/SQR-18A array currently relies on the AN/SQS-35(V) variable depth sonar hoist for deployment and retrieval. Therefore, a new hoist had to be developed for non-variable depth sonar ships and it was decided to take advantage of the handling and stowage group being developed as part of the AN/SQR-19 program. The AN/SQR-18A systems modified for interface with the AN/SQR-19 hoist are designated AN/SQR-18A(V)2's. One AN/SQR-18A(V)2 and one AN/SQR-19 hoist are being procured during development for follow-on test and evaluation. Utilization of the AN/SQR-19 hoist will require a different towing configuration than that employed with the current Variable Depth Sonar hoist. To support this towing configuration, [redacted] It is planned to employ AN/SQR-19 state-of-the-art array construction techniques in this modular array design and thus achieve better reliability and a higher performance array in the process. This will enable achievement of approximately the same sensor performance

The improved modular array will also be backfitted to all Variable Depth Sonar AN/SQR-18A's changing their nomenclature to AN/SQR-18A(V)1's. Two AN/SQR-18(V)1 modification kits are being procured during development; one for factory testing and one for follow-on test and evaluation. S1646: The AN/SQR-18A was developed under a Rapid Development Capability priority. Numerous operational deficiencies have been noted by the fleet since its introduction in FY 1978 which are a direct result of this accelerated program. These deficiencies impose an intensive workload on the sonar operator with concommittant reduction in performance. The specific deficiencies include [redacted] A series of engineering changes will be developed to correct these problems.

(U) RELATED ACTIVITIES: Program Element 64713N, Tactical Towed Array Sonar (AN/SQR-19); Program Element 63553N, Project S0229, Surface Ship Silencing.

(U) WORK PERFORMED BY: In House: Naval Underwater Systems Center, New London, CT (lead laboratory). Contractors: Edo Corporation, College Point, NY; Chesapeake Instrument Division, Gould Incorporated, Glen Burnie, MD.

Program Element: 25624N
Title: AN/SQR-18 Tactical Towed Array Sonar
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Forty AN/SQR-18A production systems were procured in FY 1976-1981. Service use approval was achieved in April 1980. In FY 1979, Congress directed the initiation of the AN/SQR-18A(V) program and a level-of-effort contract was awarded to Gould to begin system design. This effort continued throughout FY 1980. FY 1981 full scale development contracts were awarded to Edo Corporation and Chesapeake Instrument division for construction of AN/SQR-18A(V)1 and (V)2 production prototypes. Factory testing commenced on the first AN/SQR-18A(V)1 production prototype system.

2. (U) FY 1982 Program: Production prototype construction for the second AN/SQR-18(V)1 will be completed and factory testing and shipboard Follow-on Test and Evaluation of the system will be accomplished. Production prototype construction for the AN/SQR-18A(V)2 will commence.

3. (U) FY 1983 Planned Program: Production of AN/SQR-18(V)1 backfit kits will commence. Production prototype construction and factory testing for the AN/SQR-18A(V)2 will be completed. Shipboard installation and Follow-on Test and Evaluation will be conducted for the AN/SQR-18A(V)2 and Handling and Stowage Equipment.

4. (U) FY 1984 Planned Program: Deficiencies in the AN/SQR-18A(V)2 noted during follow-on test and evaluation will be corrected. Full scale development contracts will be awarded for operability improvements.

5. (U) Program to Completion: Engineering changes to improve system operability will be developed and tested as they are defined.

6. (U) Milestones:

		Date
a.	SQR-18A(V)1 Follow-on Test and Evaluation	FY 1982
b.	Award SQR-18A(V)1 Production Contract	FY 1983
c.	SQR-18A(V)2 Follow-on Test and Evaluation	FY 1983
d.	Award SQR-18A(V)2 Production Contract	FY 1985
e.	SQR-18A(V)1 Initial Operating Capability	FY 1984
f.	Award Operability Improvement Full Scale Development Contract	FY 1984
g.	SQR-18A(V)2 Initial Operating Capability	

*Date in parentheses is the milestone date shown in FY 1982 Program Element Descriptive Summary. The change reflects revised

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25633N

Title: Aircraft Equipment Reliability and Maintainability Improvement Program (AERMIP)

DoD Mission Area: 238 - Other Naval Warfare

Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,642	8,231	7,067	8,453	Continuing	Continuing
W1041	Aircraft Equipment Reliability and Maintainability Improvement Program	6,642	8,231	7,067	8,453	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Aircraft Equipment Reliability and Maintainability Improvement Program was established to meet the need for a continuing program for improving carrier aircraft operational readiness through selected reliability and maintainability improvements. It is a basic element of the Naval Air Systems Command reliability improvement effort for in-service aircraft equipment. It provides for upgrading the reliability and maintainability of deficient avionic and non-avionic items, often Government-Furnished Equipment, frequently common to two or more aircraft models. Existing technology is used to design, fabricate and test prototype modification kits, or test and select available substitute materials, parts, components, modules or subsystems, calculated to improve the reliability of Fleet aircraft equipment. The program provides non-recurring prerequisites for many aircraft and equipment changes subsequently procured for in-service, in-production and spares inventories.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Requirements are based on problems identified through standard failure reporting systems, carry-overs from prior years averaging fifteen items per year, and an anticipated level of newly identified deficiencies. The level of effort has been determined from eight prior years experience plus expansion of the program by OUSDR&E (9 April 1979) to add land-based tactical aircraft: (e.g., P-3, OV-10, EC-130). Consideration has been given to the fact that the increasing number of total flight hours accumulated in the operational environment by new aircraft which have incorporated new technology equipment and materials will disclose unforecasted failures and undesirable effects. There are no major milestones, since each task is a discrete effort. As this is a continuing program, the above funding profile includes outyear escalation or encompasses all work and development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: FY 1981 decrease of $2,454 results from five reprogramming actions and various allocation reductions. Decreases of $1,230 in FY 1982 and $4,657 in FY 1983 result from Navy budget reduction and result in a reduction in level of effort.

Program Element: 25633N

Title: Aircraft Equipment Reliability and Maintainability Improvement Program (AERMIP)

DoD Mission Area: 238 - Other Naval Warfare

Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,235	9,096	9,461	11,724	Continuing	Continuing
W1041	Aircraft Equipment Reliability and Maintainability Improvement Program (AERMIP)	8,235	9,096	9,461	11,724	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 25633N

Title: Aircraft Equipment Reliability and Maintainability Improvement Program (AERMIP)

DoD Mission Area: 238 - Other Naval Warfare

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Aircraft Equipment Reliability and Maintainability Improvement Program was initiated in FY 1974 as an effort toward achieving a measured improvement in carrier aircraft operational readiness through carefully selected reliability and maintainability improvements. Program scope was enlarged in April 1979 by OUSDRE to add land-based tactical aircraft. Documented experience shows that one of the most serious deterrents to achieving desired levels of aircraft operational efficiency is the low Mean-Flight-Hours-Between-Failures of many aircraft systems and equipments. As items age in the operational environment, failure data accumulate which reveal a continuing series of newly identified requirements for R&D improvements affecting aircraft efficiency and operational readiness rates. Over twenty problem areas are identified annually which have low Mean-Flight-Hours-Between-Failures records, consume excessive maintenance-man-hours aboard the carriers and urgently require solutions. The Aircraft Equipment Reliability and Maintainability Improvement Program provides the non-recurring costs for design, fabrication, and test of prototype modification kits as well as the test and selection of industry available alternative replacement parts or materials. The increased number of aircraft service life extensions required during this time period will necessitate continued operation of many orginial equipment items. A major effort (during FY 1983 and out-years), providing important benefits across the aging avionics inventory, is a continuing program of selected replacement of high-failure-rate portions of systems and equipments with highly reliable circuitry employing state-of-the-art components. Candidates generally contain old electro-mechanical modules, vacuum tube circuitry, or early solid state technology components which have developed high failure rates. They are usually high-cost, high-inventory items whose complete replacement with operationally equivalent, new production, state-of-the art equipment is economically impossible. Such modifications will reduce piece-part count, provide better parts commonality, and reduce spares requirements. Modifications to increase specified performance capabilities of equipment are excluded. Recurring costs for subsequent procurement of retrofit kits or new equipments will be borne by appropriate aircraft procurement, modification, or spares programs.

(U) RELATED ACTIVITIES: There are no specifically related DOD RDT&E projects. Many contribute to the currently available technology used by the Aircraft Equipment Reliability and Maintainability Improvement Program.

(U) WORK PERFORMED BY: In-House: Naval Avionics Center, Indianapolis, IN; Naval Weapons Support Center, Crane, IN; Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Air Rework Facilities North Island, San Diego, CA and Norfolk, VA; plus others to be determined. Contractors: Grumman Aircraft Corporation, Bethpage, NY; Teledyne Semi-Conductor, Mountain View, CA; Sanders Associates, Nashua, NH; Raytheon Inc, Santa Barbara, CA; PRD Electronics, Westburg, L.I. NY; Teledyne-Ryan Electronics, Los Angeles, CA; Boeing-Vertol Company, Philadelphia, PA; Kaiser Electronics, Palo Alto, CA; Sikorsky Aircraft, Stratford, CN; Singer Company, Little Falls, NJ; plus others to be determined.

Program Element: 25633N

Title: Aircraft Equipment Reliability and Maintainability Improvement Program (AERMIP)

DoD Mission Area: 238 - Other Naval Warfare

Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed tasks have resulted in selection of eleven different improved materials substitutions and the incorporation in new production and/or retrofit modifications of thirty-three different reliability improvements. Examples of completed tasks are listed below.

(a) The AN/APN-141 Electronic Altimeter was modified to include over fifty improved components. A Retrofit Program for a limited number of sets was implemented beginning with one F-4N and one TA-4J squadron. It was so successful it was extended to five F-4N, three P-3B and all TA-4J squadrons. Plans call for coverage of all aircraft not scheduled for retrofit with the AN/APN-194, thus providing direct benefit to Fleet units.

(b) An improved AN/AVA-1 Vertical Display Indicator for the A-6E will increase the present Mean-Flight-Hours-Between-Failure of 28.5 hours to a new Mean-Flight-Hours-Between-Failure of over 175 hours.

(c) Electronic synchronizers to replace manual potentiometers in the Pitch and Roll Control Amplifiers of the AN/ASW-26 and AN/ASW-30 Automatic Flight Control Systems in A-7 aircraft will provide a major reduction in Maintenance-Man-Hours spent balancing parallel channels in Automatic Flight Control Systems.

(d) EC2181 sealant used in helicopter rotor blade crack detection systems was reversion prone and hydrolytically sensitive. The manufacturer, 3M Corporation, decided to discontinue production due to Occupational Safety and Health Administration regulations rather than attempt to improve the sealant. Commercially available alternative materials were tested and sealant V-356-60 was selected as a replacement. It is now used in both new production blades and blades undergoing depot overhaul.

(e) Hooks on Aero 7/20/27/65 and BRU-10/11 bomb racks and Aero 1A adapters were made of 4140 steel (plated as a corrosion preventive action) or PH 17-4 corrosion-resistant-steel. Both materials were subject to failure, usually due to stress corrosion cracking. Alternative newer steels were tested. PH 13-8 MO CRES, selected as a replacement material for all hooks, is now a Navy-USAF standard.

(f) AV-8A and TAV-8A Head-Up-Display Set improvements.

(g) Improved A-7 Angle of Attack Indicator.

(h) Installed improved disc clutch in Auxiliary Power Plant to Accessory Gearbox Drive system, CH-53A/D and RH-53D.

Program Element: 25633N

Title: Aircraft Equipment Reliability and Maintainability Improvement Program (AERMIP)

DoD Mission Area: 238 - Other Naval Warfare

Budget Activity: 4 - Tactical Programs

(i) Replaced four major modules in Air Data Computers for the EA-6A and EA-6B.

(j) Improved ejection bomb rack breeches and concurrently made compatible with NATO Standard Cartridges.

2. (U) FY 1982 Program: The reliability and maintainability improvements to the AN/ALQ-126 Countermeasures Set, Radar Navigation Set AN/APN-182, Radar Beacon Set AN/APN-154, Bomb Rack Arming Unit (USN-USAF), A-6 Radar Data Converter CV1607/AVA-1, E-2 Signal Control Processor C-9281/ALR-59, A-7 Nose Landing Gear Fail-Safe Steering, Non-Ejection Multiple Bomb Rack, A-7 Pylon Electrical Cables, CH-46 Cruise Guide Indicator, AN/APN-171 Electronic Altimeter and others, will be completed. Additional tasks in progress include: Altitude Heading Reference Set AN/ASN-50, Doppler Radar Set AN/APN-190, Detector Head Assemblies DT-323 and TB-623/ASQ-81 Magnetic Anomaly Detector System, Air-lubricated bearings for Environmental Control System turbines in S-3A and F-14A.

3. (U) FY 1983 Planned Program: Carry-over efforts on above noted FY 1982 in-progress tasks will be completed. Additional tasks in progress include: S-3A communications control group OK-248 and USAF-USN Standard Air Data Computer. Improvements approved by the NAVAIR Aircraft Equipment Reliability and Maintainability Improvement Program Candidate Review Board will generally follow examples of previous years. As equipment ages under operational conditions, failure data accumulate and reveal a continuing series of new requirements. It will be necessary to provide corrective reactions to unanticipated reliability problems which will be discovered after substantial numbers of new aircraft such as the S-3A, E-2C, F-14A and F-18 have accumulated extensive flight time in their operational environments. Selected modules will be replaced in certain communications, navigation and radar sets, Identification of Friend or Foe equipment, and airborne computers. Reliability improvements to aircraft instruments, antenna systems, and electrical power systems will be considered.

4. (U) FY 1984 Planned Program: Tasks not completed in FY 1983 will be continued. New tasks will be selected by the Aircraft Equipment Reliability and Maintainability Improvement Program Candidate Review Board as requirements are identified from Fleet reports.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25634N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Silencing
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	18,190	15,363	9,283	10,706	Continuing	Continuing
S0218	Submarine Silencing	18,190	15,363	9,283	10,706	Continuing	Continuing

Sub-Tasks and Quantities are too numerous to tabulate.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The purpose of this program is to identify acoustical deficiencies in operational nuclear submarines, to define the sources of noise, and to develop and evaluate corrective hardware, materials, designs, procedures, etc., necessary for nuclear submarines to remain acoustically undetectable by enemy sensor systems and to maintain own ship quiet enough to achieve maximum benefit from installed sonar systems. The quieted submarine allows the conduct of covert operations and, in times of hot war, increases the probability of mission success by lessening the ability of enemy forces to detect, track, localize, and destroy it. Submarine Silencing Program items are implemented into operational submarines principally through existing alteration programs as well as during the design stages of new submarine acquisition programs which are supported by other appropriations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Full-scale technical evaluation of silencing prototypes including

Complete design and fabricate

FY 1983 funding decreased 6,080 from FY 1982 due to elimination of effort to design, build and test an advanced

As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: RDT&E,N - (1) FY 1981 funding has decreased by $689 due to

(2) The FY 1982 estimate has decreased by $768 due to reduction of contractor services and inflation adjustment. (3) The FY 1983 estimate has decreased by 9,161 as a result of

Program Element: 25634N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Silencing
Budget Activity: 4 - Tactical Programs

elimination of sub-tasks and reduction in scope of other sub-tasks. Other Procurement, Navy - The annual estimates for FY 1981, 1982 and 1983 have decreased by $37, $334 and $9,939 respectively, due to inflation adjustment in FY 1981, reduction in FY 1982 and transfer of some procurement programs to other Program Elements in FY 1983.

(U) FUNDING AS RELECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	16,627	18,879	16,131	18,444	Continuing	Continuing
S0218-AS	Submarine Silencing	16,627	18,879	16,131	18,444	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 EStimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Navy (Quantity)	16,845 (Various Small Items)	12,610	11,999	10,407	Continuing	Continuing

Program Element: 25634N
Title: Submarine Silencing
DOD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: An acoustical advantage is a vital requirement for detecting, classifying, tracking, and destroying enemy submarines. Currently, U.S. nuclear submarines are

Submarine silencing goals

The goals of the program cover identification of noise offenders aboard submarines, locating causes of noise generation, development of corrective procedures, designs, and materials, applications of silencing improvements, and operational evaluation to the extent of implementation. Results are applied during submarine design, construction, conversion, or backfit availabilities.

(U) RELATED ACTIVITIES: Exploratory Development, Program Element 62543N, Subproject SF43-452, Acoustical Silencing, supports the development of basic scientific principles and analytical models to the stage where they can be gainfully employed in the engineering, manufacture, and support of full scale hardware.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center (lead laboratory), Bethesda, MD; Naval Underwater Systems Center, Newport, RI; Naval Ocean Systems Center, San Diego, CA; Philadelphia Naval Shipyard, Philadelphia, PA; Puget Sound Naval Shipyard, Bremerton, WA. Contractors: General Dynamics Corporation, Electric Boat Division, Groton, CT; Westinghouse Electric Corporation, Pittsburgh, PA; Raytheon, Goleta, CA; Bolt, Beranek, and Newman, Inc., Cambridge, MA; H.I. Thomas Company, Long Beach, CA; Powertronic Systems, Inc, New Orleans, LA; Applied Research Laboratory, Pennsylvania State University, State College, PA; Tracor, Inc., Austin, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program, initiated in 1968, has developed the technology and demonstrated acoustical noise reduction using full scale hardware that has provided a In addition, improvements in

and have given ship designers the tools needed to provide future submarines with built-in acoustical advantages. Past accomplishments include development of the

Specific recent accomplishments include successful full scale evaluation of,

Program Element: 25634N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Silencing
Budget Activity: 4 - Tactical Programs

Completed design of

Evaluated SSN 637 class
and conducted evaluation of

2. (U) FY 1982 Program: Develop

Evaluate

Initiate fabrication of

Install SSN 637

during overhaul. Model test

and SSN 637

3. (U) FY 1983 Planned Program: Complete fabrication of

, development of

Conduct laboratory evaluation of breadboard

Complete design and fabricate

Evaluate prototype

Demonstrate sonar

Continue development of hardware, designs and techniques to reduce high speed sonar self noise, eliminate

noises and support quieting aspects of introducing hardware to improve nuclear submarine operational characteristics.

4. (U) FY 1984 Planned Program: Evaluate

Install

and develop

Continue development of hardware, designs and techniques to reduce high speed sonar self noise, eliminate

noises and support quieting aspects of introducing hardware to improve nuclear submarine operational characteristics.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25645N Title: Modular Glide Weapon Improvement Program
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	799	2,117	5,260	1,567	2,953	39,692
W0559	Modular Glide Weapon Improvement Program	799	2,117	5,260	1,567	2,953	39,692

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Apply technological advances to make the existing Walleye inventory more effective: (1) Increase the anti-jam capability through the use of a data link that is less vulnerable to countermeasures, (2) Improvements in other Walleye subsystems and components (receiver-decoder, vidicon), (3) Multi (five) channel operation, (4) Increased stand-off range, and (5) Walleye weapon interface with F/A-18 and A-6E aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete development of silicon vidicon (data link video enhancement). Conduct Operational Test and Evaluation. Complete Large Scale Integration Receiver-Decoder improvement. Continue adaptive null steering (anti-jam improvement) and aircraft/weapon interface compatibility. The increase from FY 1982 to FY 1983 is caused by Modular Glide Weapon Improvement Program peaking in FY 1983. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: The FY 1981 estimate was reduced by $8, the FY 1982 estimate was reduced by $82, the FY 1983 estimate was reduced by $88, and the additional to completion was increased by $1,357. These changes are associated with an extensive restructuring of the program. The restructuring sought improvements that would add significantly to weapon capabilities and be suitable for early incorporation into the Walleye inventory. Accordingly, development of an improved power supply for the ram air turbine and monitoring progress of the joint services (Army-Air Force) hardened data link development was discontinued; modification for five-channel operation, simulation and analysis, and data link video enhancement focusing on application of a new silicon vidicon was continued; data link improvements such as adaptive null steering (anti-jam improvement) and Large Scale Integration Receiver-Decoder (component improvement) and aircraft/weapon interface compatibility was added.

Program Element: 25645N
Title: Modular Glide Weapon Improvement Program
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,000	807	2,199	5,348	1,596	36,946*
W0559	Modular Glide Weapon Improvement Program	2,000	807	2,199	5,348	1,596	31,202

* Program decisions occurring too late for incorporation accounted for the differences in Total Estimated Cost shown here.

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Navy		13,669	24,642	13,169	15,100	Continuing	Continuing
Quantity	(Walleye Extended Range/Data Link)	(200)	(444)	(200)	(200)	TBD	TBD

Program Element: 25645N
Title: Modular Glide Weapon Improvement Program
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The basic Walleye weapon is an electro-optical (television) guided glide bomb. Approximately Walleye weapons are in the Navy inventory, of these weapons are direct-fire weapons (locked on target prior to launch, with an effective operational range have data link provisions incorporated, which allow an indirect fire capability (locked on target area, aim-point updated during flight) providing improved accuracy and increased operational range from high altitude. As threat defenses increase, the need for greater stand-off ranges to minimize aircraft attrition, jam resistant data links to improve penetrability of the weapon, multi-channel operation to raise probability of kill and a new vidicon capable of haze/fog penetration is being addressed by the activities in this weapon improvement program. These efforts along with improvements in Walleye subsystems and components and computer simulation modeling are directed at maintaining/upgrading the effectiveness of the Navy's Walleye inventory. Aircraft/weapon interface compatibility effort is directed to continuing Walleye availability to the fleet as A-7E aircraft are replaced by F/A-18 and A-6E aircraft.

(U) RELATED ACTIVITIES: Advanced Development Model Imaging Infrared Seekers that were procured in FY 1979 have been utilized in gathering ship signature/algorithm data for application to Imaging Infrared Maverick, HARPOON, Medium Range Air-to-Surface Missile and other related Imaging Infrared programs.

(U) WORK PERFORMED BY: In-House: Naval Avionics Center, Indianapolis, IN; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Pt. Mugu, CA. Contractor: Not applicable.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Basic WALLEYE I deployed to Southeast Asia in March 1967, followed by WALLEYE II in July 1972. Extended Range WALLEYE II with data link was deployed in 1974. Successful low altitude launch in 1978. Integration and testing of an imaging infrared seeker initiated with the Air Force in 197? with flight testing of an advanced development model in 1979. A data link hardening project as directed by OSD was initiated in 1977. Late in 1978, began implementation of new production of an additional 100 WALLEYE I (Extended Range/Data Link) weapons for the government of Israel. In compliance with requirements and schedules established by the Air Force, a modified WALLEYE data link (five-channel) was designed for the GBU-15 and provided in 1979 and 1980. Development and test of Engineering Development Models of an interim jam resistant data link was completed and procurement was initiated under the FY 1979 Walleye Conversion Program. Initiated development of data link modification for five-channel operation in FY 1980. In FY 1981 initiated development of a silicon vidicon which will provide earlier target acquisition and lock-on, allowing for earlier weapon release in environments of light fog and dense haze.

2. (U) FY 1982 Program: Continue development of silicon vidicon. Complete development of modification for five-channel operation, introduce to Walleye conversion program via Engineering Change Proposal. Continue simulation and analysis. Initiate

development of data link improvements such as adaptive null steering (anti-jam improvement) and Large Scale Integrated Receiver-Decoder (component improvement). Initiate aircraft/weapon interface compatibility.

3. (U) FY 1983 Planned Program: Complete development of silicon vidicon. Conduct Operational Test and Evaluation. Complete simulation and analysis. Complete Large Scale Integration Receiver-Decoder (component improvement) and introduce into Walleye Conversion program. Continue adaptive null steering improvement and aircraft/weapon interface compatibility.

4. (U) FY 1984 Planned Program: Introduce silicon vidicon into Walleye Conversion Program. Complete adaptive null steering and introduce into conversion program. Continue aircraft/weapon interface compatibility.

5. (U) Program to Completion: Complete aircraft/weapon interface compatibility in FY 1986.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25658N
Title: Laboratory Fleet Support
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (DOLLARS IN THOUSANDS)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,273	4,283	4,669	5,336	Continuing	Continuing
Z0834	Laboratory Fleet Support	2,273	4,283	4,669	5,336	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: RDT&E funds for Navy laboratory assistance to the Fleet. Technical and operational problems addressed relate to improvement of in-service systems and their utilization. The efforts complement the normal RDT&E system by permitting rapid application of technology and by serving as a catalyst to identify new operational needs, demonstrate feasible solutions, and propose new system developments. This program supports all Navy mission areas since it provides across-the-board R&D support to the Fleet.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The increase in funding between this and previous descriptive summaries reflects a transfer of funds previously provided from Exploratory Development programs and does not indicate a change in the level of effort.

(U) Four FY 1983 efforts will focus on these specific areas: (1) command, control, and comunication deficiencies and procedural or critical subsystem developments to enhance performance; (2) timely tactical identification or environmental effects that impact detection, classification, and targeting; (3) individual performance enhancement through improved procedures, training, training aids, and work environment; and (4) Marine Corps vehicle, weapon, and sensor deficiencies and performance enhancing subsystem developments. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows:

For FY 1981 the reduction of $414 resulted from inflation reductions of $17 and a Navy budget reduction of $397.

For FY 1982 the net increase of $1,142 results from an increase of $1,527 due to transfer of effort from exploratory development to this program element, partially compensated by a reduction of $385 due to Navy budget reductions.

For FY 1983, the net increase of $1,201 results from an increase of $1,527 due to transfer of effort from exploratory development to this program element partially compensated by a reduction of $326 due to Navy budget reductions.

Program Element: 25658N
Title: Laboratory Fleet Support
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED ON THE FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands)

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,458	2,687	3,141	3,468	Continuing	Continuing
Z0834	Laboratory Fleet Support	2,458	2,687	3,141	3,468	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 25658N
DoD Mission Area: 235-Naval Warfare Support

Title: Laboratory Fleet Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Scientists and engineers from the Navy R&D Centers are temporarily assigned for one- or two-year periods to Navy and Marine Corps operational commands. Providing technical advice on the best operational utilization of deployed systems and subsystems, participating in the identification and articulation of technical problems that impact operational readiness and effectiveness, aiding in the preparation of draft operational requirements, and coordinating or supervising in-site feasibility demonstrations are typical of their activities. This results in a vitally needed communication link between the Navy's RDT&E establishment which needs to know the detailed technical nature of problems to effect appropriate solutions and the operational commands which need to operationally plan on the basis of both current and future (but near term) technological advances. The assignments also result in a cadre of R&D Center personnel with a firsthand knowledge of the operational environment who can positively influence the relevance of future RDT&E efforts.

(U) To support the rapid solution of unanticipated operational command identified problems related to in-service systems, the Laboratory Fleet Support Program sponsors short term technical efforts within the Navy R&D Centers. Generally, these efforts rely on emerging technology or the innovative application of existing technology. They frequently result in system or subsystem modifications that extend their utility so that a new or emerging threat can be accommodated or operability, maintainability, and reliability is improved. Since the problems are unanticipated, potential solutions demonstrated by the program are well-documented and all efforts are carefully coordinated with those Navy and Marine Corps organizations primarily responsible for longer term R&D sponsorship or acquisition. In general, the work performed is broad in scope, covering weapons, sensors, support systems, vehicles, machinery, and training devices, and problems related to operational improvements in all Navy and Marine Corps mission areas.

(U) RELATED ACTIVITIES: The exploratory development category supports similar short term efforts to those described above for problems of a more fundamental nature where in-service systems or processes do not exist but where operational performance is nevertheless adversely impacted. These efforts attempt to rapidly apply the emerging technology base through system or subsystem developments or to add a new dimension to operational planning. The information gained from successes (or failures) are in turn added to the technology base so that the relevance of the knowledge to future Navy and Marine Corps problems is enhanced.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Silver Spring, MD., is lead laboratory. All other in-house Navy RDT&E Centers support this program.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In response to specific requests from Commander in Chief, U. S. Atlantic Fleet, Commander in Chief, U.S. Pacific Fleet, Commander in Chief, U. S. Naval Forces Europe and their subordinate commanders, Laboratory Fleet Support tasks addressed included Fleet operational readiness problems in the areas of submarine, surface, air, intelligence, and special warfare. Generally, these tasks were directed towards solving deficiencies found in currently deployed hardware. Examples of successful tasks are:

Program Element: 25658N
DoD Mission Area: 235-Naval Warfare Support

Title: Laboratory Fleet Support
Budget Activity: 4 - Tactical Programs

(U) ELECTRONIC WARFARE -

(U) MINE WARFARE - (1) Developed and tested low cost modifications to MK 83 bomb case so that it can be used as training mine to simulate air-dropped characteristics of Mine MK 52 and DST MK 40. The Naval Sea Systems Command is continuing development. (2) Mine MK 52 modified The Naval Sea Systems Command is continuing development. (3) Countermeasures system developed System utilizes readily available components. No other system currently in inventory. Anticipate that the Naval Sea Systems Command will continue development.

(U) COMMAND, CONTROL AND COMMUNICATIONS - (1) Expedited provision command and control. First systems installed and operational in less than three months; (2) performed experiments to verify model used to predict best long haul High Frequencies; (3) developed training tool for shipboard communicators in use of effective High Frequency for long-haul propagation that minimizes the probability of intercept.

(U) MARINE CORPS LAND WARFARE - Developed weapons-mount ammo-feed modifications and weapons-mount modifications that would substantially increase the fire power and survivability of the tracked amphibian landing vehicle (LVTP-7).

(U) ENERGY EFFICIENCY - Consulted on the development of a microprocessor-based model for predicting optimum transit speeds and tracks. Initial use resulted in substantial fuel oil savings for aircraft carrier transits to the Indian Ocean.

(U) MANPOWER SAVINGS - Developed microprocessor-based model that substantially reduces the Fleet staff labor intensity of ship scheduling and service allocation.

2. (U) FY 1982 Program: Approximately one-third of this year's budget will be used to complete 15 tasks begun in previous years or to respond to new requests for assistance from major Navy and Marine Corps operational commands. Examples are: (1) MINE WARFARE - Existing Offshore Mine Sweepers have been modified extensively since the 1960's Offshore Mine Sweeper's will be inspected and their vulnerability assessed. Explosives contained in long, large-diameter hoses (line charges) might be suitable. Line charge concepts are being investigated. (2) COMMAND, CONTROL AND COMMUNICATIONS - Improved geopositional navigational information is critical to long-range targeting. Methods of providing these data (including procedural) are being investigated. The Seventh Fleet command ship, BLUE RIDGE, handles large volumes of message traffic. The existing onboard internal message distribution system is an older one-of-a-kind

system which has poor reliability and is difficult to maintain. Key subsystems are being redesigned using current technology to alleviate the problem. (3) ANTI-SUBMARINE WARFARE - Software has been developed to demonstrate the feasibility of employing desk-top calculators as aids to classification utilizing data extracted from LOFAR-grams. An improved tracker has been developed for the AN/SQR-18A sonar which can relieve the operator of most of the tracking load.

(U) Two-thirds of the budget will be used to support 25 scientists or engineers from the Navy R&D Centers who are assigned as principal advisors and consultants to major Navy and Marine Corps operational commands. These are temporary assignments of from one to two years. Duties include assisting in the definition of operational deficiencies and their technical implications caused by aging equipment, changing threats, environment, etc., and expediting efforts to solve technical problems impacting operational readiness.

3. (U) FY 1983 Planned Program: Laboratory Fleet Support will continue to respond to problems identified by operational commanders. Potential future tasks include; (1) Command, Control, and Communication deficiencies and procedural or critical subsystem developments to enhance performance; (2) timely tactical identification or environmental effects that impact detection, classification, and targeting; (3) individual performance enhancement through improved procedures, training, training aids, and work environent; and (4) Marine Corps vehicle, weapon, and sensor deficiencies and performance enhancing subsystem developments.

(U) Laboratory Fleet Support will also continue to support the temporary assignment for 25 to 30 scientists and engineers to major Navy and Marine Corps operational commands as principal technical advisors and consultants.

(U) Fundamentally, tasks begun under Laboratory Fleet Support programs are intended to retain or improve the efficiency of existing Navy weapon systems, support systems, and platforms degraded because of age or changing threats. (Many currently deployed systems are over ten years old and will be retained for at least another ten years.) Although there may be adequate logistic support for these systems, they frequently require additional research and development support. Improvements under the Laboratory Fleet Support program will target better interfaces between older systems or older and newly deployed systems to achieve operational effectivness. Injections of new technology concepts into existing hardware will reduce maintenance, simplify operability stressing reduced weapon response times, and provide more realistic training techniques. More rapid technical achievement of an improved operational capability will be accomplished through a direct Fleet dialogue and increased responsiveness of the Navy Laboratory community. These objectives will be achieved under combined management of the Laboratory Fleet Support program with the Navy Science Assistance Program, taking full advantage of the Navy Science Assistance Program interlaboratory communication network which promotes quick response Fleet technical assistance.

Program Element: 25658N
DoD Mission Area: 235-Naval Warfare Support

Title: Laboratory Fleet Support
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue program as discussed for FY 1983.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25662N
Title: Aircraft Propulsion Evaluation - General
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,693	2,000	2,835	3,114	Continuing	Continuing
W0598	Aircraft Propulsion Evaluation - General	2,693	2,000	2,835	3,114	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for test and evaluation not covered elsewhere of gas turbine engines, propellers, accessories, and fuels and lubricants. The program element also provides for updating engine and component specifications to meet new developments in technology. The engineering effort enhances the operational capability of propulsion systems and the readiness of fleet aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The funds requested will cover tasks in the areas of fuels and lubricants, specifications and test definition, and engine, auxiliary power unit, starter and accessory testing. Specific tasks include: maintain and update the JP-5 physical/chemical properties data base; initiate pilot test of field JP-5 additive injection system; and examine, test and evaluate malfunctioning fuel handling and decontamination equipment. Continue monitoring lubricity and contaminant identification for JP-5 at various bases. Complete the development of the new transmission lubricant specifications for helicopter transmissions/gearboxes. Initiate transmission oil testing of a least three samples of oil to determine optimum properties such as load carrying, viscosity, and film strength. As part of continuing effort, conduct qualification tests for oil companies of new or modified oils to insure adequate supply and to minimize procurement costs. Continue updating specifications for auxiliary power units and engine starters; continue tri-service coordination on revised MIL-E-5007D; coordinate MIL-E-8593B with other services; prepare December 1982 edition of "Propulsion Characteristics Summary Report"; measure performance and mission reduction effects of a low pollution combustor modification for the F404 engine; and perform stability development test (using a random frequency generator) on a TF30 engine. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are -$25 in FY 1981, -$904 in FY 1982, and -$449 in FY 1983, are the result of refined estimates for escalation and Navy program budget adjustments.

Program Element: 25662N
DoD Mission Area: 238 - Other Naval Warfare
Title: Aircraft Propulsion Evaluation - General
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This continuing program conducts the Navy standard test and evaluation not covered elsewhere of gas turbine engines, propellers and accessories, and fuels and lubricants for aircraft engines and transmissions. Testing is conducted on service fuels and lubricants to assure maximum performance and cleanliness, to evaluate new suppliers of fuels and lubricants, and to decrease engine and transmission maintenance and overhaul time through the evaluation of new lubricants. New developments in engine technology are met by updating engine and component specifications.

(U) RELATED ACTIVITIES: None

(U) WORK PERFORMED BY: In-House: Naval Air Propulsion Center (NAPC), Trenton, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program was initiated in FY 1968. Recent accomplishments include:

Fuels and Fuel Systems: (a) Completed first phase of gas chromatography evaluation of JP-5. Authorized use of new gas chromatography process as an alternative to simple distillation analysis. Initiated a computer program to determine the correlation between various established fuel physical/chemical properties and those revealed by gas chromatography. (b) Completed evaluation of low-lubricity, simulation fluids. (c) Continued work on contaminant identification, lubricity monitoring and on-site additive injection. (d) Initiated program to monitor the concentration of new High Flash Fuel System Icing Inhibitor in fuel delivered to aircraft.

Lubricants: (a) Qualified two MIL-L-6082 and two corrosion-inhibited MIL-L-23699 oils. Evaluated new compatibility testing techniques for qualified MIL-L-23699 oils and completed test program establishing higher sulfur limits for MIL-L-6082 oils. (b) Developed corrosion inhibition test procedure for use in lubricant batch acceptance. (c) Conducted flight evaluation of corrosion-inhibited MIL-L-23699C oil in engines of S-3A aircraft. (d) Conducted program to assess effectiveness of additives on gear scuffing at higher temperatures. (e) Conducted investigation of optimum lubricant for helicopter transmission applications.

Specifications and Test Definitions. (a) Completed the revision of MIL-P-8686 for auxiliary power units and MIL-S-22999A, MIL-S-22518B and MIL-S-19557C for engine starters. (b) Continued development of rationales for testing and qualification requirements of MIL-E-5007D and MIL-E-8593A engine specifications. (c) Established qualification and verification test requirements for engine-mounted electronic controls to be included in MIL-E-5007D and MIL-E-8593A.

Auxiliary Power Units/Starters/Accessories: Completed qualification testing of Bendix ATSCV-4 control valve and initiated verification tests on Parker Hannifin ATSCV-4 valve used on S-3A aircraft.

Program Element: 25662N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Propulsion Evaluation - General
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,654	2,718	2,904	3,284	Continuing	Continuing
WO598	Aircraft Propulsion Evaluation - General	2,654	2,718	2,904	3,284	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not Applicable.

Engine: (a) Evaluated data on infrared signature characteristics of CH-53D helicopter with and without suppression hardware. The results of this evaluation will be used to expand the current data base on operational helicopters and fleet deployed suppression systems. (b) Completed performance verification testing of F402 (AV-8) engine at various vectored nozzle angles. (c) Completed functional testing of the gyroscopic test rig.

2. (U) FY 1982 Program:

Fuels and Fuel Systems: (a) Initiate development of a data base on JP-5 physical/chemical properties by transferring batch acceptance data to an interactive system computer program. Monitor changes and determine trends in these properties. (b) Verify results of gas, chromatography correlation study. (c) Continue monitoring the concentration of high flash additive in fuel delivered to aircraft. (d) Continue work on contaminant, identification and lubricity monitoring. (e) Complete feasibility study for on-site additive injection.

Lubricants: (a) Complete flight evaluation of corrosion-inbibited MIL-L-23699C oil. (b) Continue investigation of optimum lubricant for helicopter transmission applications and formulate preliminary specifications. (c) Continue the development of corrosion inhibition test procedure for use in lubricant batch acceptance (d) Continue test program to assess effectiveness of additives on gear scuffing at higher temperatures. (e) Continue qualification of new or modified lubricating oils to insure adequate supply and minimize procurement costs.

Specifications and Test Definitions: (a) Continue updating specifications for auxiliary power units and engine starters. (b) Continue development of rationales for requirements of MIL-E-4007D and MIL-E-8593A engines and general specification revisions for Navy turbojet and turbofan engines. (c) Support tri-service coordination of revised MIL-E-5007D and MIL-E-8593B engine specifications.

Auxiliary Power Units/Starters/Accessories: Initiate verification tests on Parker-Hannifin ATSCV-4 valve and Solar production T-62T-40B auxiliary power unit for SH-60B.

Engine: (a) Continue developing data base on infrared signature suppression characteristics of CH-53E and other Navy/Marine helicopters. (b) Additional design analysis, vectored thrust testing, hardware fabrication and verification for VSTOL engine configurations. (c) Continue development of advanced visible smoke measuring system. (d) Initiate development and evaluation program to determine effectiveness of vitreous enamel coatings as engine combustor liners.

3. (U) FY 1983 Planned Program: The funds requested will cover tasks in the areas of fuels and lubricants, specifications and test definition, and engine, auxiliary power unit, starter and accessory testing. Specific tasks include: maintain and update the JP-5 physical/chemical properties data base; initiate pilot test of field JP-5 additive injection system, examine, test and

evaluate malfunctioning fuel handling and decontamination equipment. Continue monitoring lubricity and contaminant identification for JP-5 at various bases. Complete the development of the new transmission lubricant specifications for helicopter transmissions/gearboxes. Initiate transmission oil testing of a least three samples of oil to determine optimum properties such as load carrying, viscosity, and film strength. As part of continuing effort, conduct qualification tests for oil companies of new or modified oils to insure adequate supply and to minimize procurement costs. Continue updating specifications for auxiliary power units and engine starters; continue tri-service coordination on revised MIL-E-5007D; coordinate MIL-E-8593B with other services; prepare December 1982 edition of "Propulsion Characteristics Summary Report"; measure performance and mission reduction effects of a low pollution combustor modification for the F404 engine; and perform stability development test (using a random frequency generator) on a TF30 engine.

4. (U) FY 1984 Planned Program: Continue programs evaluating engine and engine accessory performance, fuel, lubricant and additive performance properties and quality characteristics and revising military specifications and testing standards for engine related hardware. Specific tasks include: maintain and update the data base on JP-5 physical/chemical properties; continue testing of field JP-5 additive injection system; continue qualification of new or modified lubricating oils; continue testing of lubricants, materials/coating at elevated temperatures; continue coordination of MIL-E-5007D and MIL-E-8593B with other services; perform performance verification test of a T7000-GE-401 engine; initiate performance verification tests for Lucas MK IV starter and for Sunstrand F-18 starter.

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

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25663N
Title: Aircraft Flight Test General
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,830	897	953	1,016	Continuing	Continuing
W0599	Aircraft Flight Test General	1,830	897	953	1,016	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: A continuing program established to provide flight tests needed to improve in-service aircraft operations. It supports (1) Flight Test of equipment/sub-systems/procedures to be used to improve safety, reliability or mission effectiveness; (2) Aircraft flight tests to evaluate Fleet-reported stability, control, weapons delivery, and environment problems; (3) Development of flight test techniques and associated engineering analyses to better evaluate Fleet aircraft and related airborne equipment; and (4) Flight test and evaluation of non-Navy aircraft and related equipment. No other program provides for aircraft/ship dynamic interface tests or in-flight refueling tests of newly matched tanker-receiver aircraft combinations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Flight tests are projected for: Four different helicopter ship dynamic interface tests; Equipment and component installation changes or additions for various aircraft, such as KA-6D in-flight defueling system; Definition of flight parameters for Fleet reported stability and control problems; Evaluations relating to new stores/aircraft combinations. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: FY 1981 increased by $969 for C-2A Aerial Refueling, AH-64 Assessment, SH-2F Updated Avionics, P-3 Sensor Station Display Upgrade. Decreases of $113 in FY 1982 and $[illegible]49 in FY 1983 are the result of Navy budget reduction and result in a reduction in level of effort.

Program Element: 25663N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Flight Test General
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	700	861	1,010	1,102	Continuing	Continuing
W0599	Aircraft Flight Test General	700	861	1,010	1,102	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 25663N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Flight Test General
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides funding for Special Flight Test Projects primarily in support of in-service Fleet aircraft. Projects are in the following areas: (1) Flight Tests of equipment/sub-systems/procedures to be used to improve safety, reliability or mission effectiveness; (2) Flight tests to evaluate Fleet reported stability, control, weapons delivery and operational environment problems; (3) Development of flight test techniques and associated engineering to better evaluate Fleet aircraft and related airborne equipment; and (4) Flight tests and evaluations of non-Navy aircraft and related equipment. The specific work to be performed in any fiscal year is identified during the last quarter of the immediately preceding fiscal year. As high priority new requirements arise during the year, funds may be added specifically for each discrete test.

(U) RELATED ACTIVITIES: There are no specifically related DOD RDT&E projects.

(U) WORK PERFORMED BY: In-House: Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center, Pt. Mugu, CA; Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA: Naval Air Propulsion Center, Trenton, NJ. Contractors: Boeing-Vertol Company, Philadelphia, PA; Grumman Aerospace Corp., Bethpage, NY; Kaman Aerospace Corp., Bloomfield, CT; others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Prior year discrete tests include: C-2A "No Flaps" landing tests (FY-79); AH-1T/AH-1J/UH-1N dynamic interface test with LPH/LHA class ships (FY-79); Gunfire vibration tests of AERO 65/GPU-2/A/OV-10 aircraft (FY-79); A-7 tests of simplified engine monitoring system (FY-80); OV-10A tests of boom and nacelle structural reinforcements (FY-80); Determination of CH-53D power loss due to exhaust ingestion (FY-80); AV-8A/LSD ship compatibility tests (FY-80). FY 1981 discrete tests (FY-80): Spin evaluation of A-7 in a symmetric empty fuel tank loading configuration; Evaluation of A-7E weapon delivery accuracy after adding Automatic Maneuvering Flaps; H-46/USS New Orleans and SH-2F/DD-963 ship dynamic interface tests; OV-10A shipboard suitability tests; Evaluation of TA-77C/TF30-P-4088 Aural Stall Warning System and Hover Approach Coupler System; Evaluation of AN/ARA-63 Electro-Magnetic Interference Filtering modification; Evaluation of P-3 sensor station 3 Display and Control Upgrades; C-2A Aerial Refueling System Technical Assessment of AH-64 Advanced Attack Helicopter.

2. (U) FY 1982 Program: Completion of Navy aircraft/USAF KC-10A interoperability tests; Evaluations of SH-2F updated avionics and armament systems improvements; Update of Day and Night Carrier Landing parameters; Evaluations of USAF Prototype Hose and Drogue KC-135 Aerial Refueling System with Navy receiver aircraft; Dynamic interface tests of SH-2F/FFG-7, CH-46E and RH-53D/LPH/LHA DD 963 ships; Additional projects if high priority requirements are identified, validated, and funded.

3. (U) FY 1983 Planned Program: Projected tests include four helicopter/ship dynamic interface tests; Evaluation of KA-6D in-flight defueling system; Equipment and component flight tests of installation changes in various Fleet aircraft; Instrumented

flight tests to define problem parameters and corrective actions in response to Fleet reported aircraft stability and control deficiencies.

4. (U) FY 1984 Planned Program: Tasks not completed in FY 1983 will be completed. New tasks identified during the final quarter of FY 1983 will be initiated.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25667N
DoD Mission Area: 231 - Anti-Air Warfare

Title: F-14A Squadrons
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,723	16,965	14,724	17,455	103,043	228,710
W0846	Alternate Fighter Engine	11,723	1,993	0	0	58,894	137,410
W1408	F-14 Radar Improvement Program	0	9,478	14,724	17,455	44,149	85,806
W1503	F-14 Avionics	0	5,494	0	0	0	5,494

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element constitutes a requirement for operational improvement of F-14A squadrons in order to counter the projected threat in the mid-1980s and aggregates former related elements as projects under one element. SOR W-16-27 established requirements for very high performance, long endurance Fleet Air to Defense aircraft with long range fire control/weapons system capability. The projected threat consists of improved Air-to-Surface Cruise Missiles and launch platforms with extended ranges and increased operating speed. Improvement of the F-14A in three major areas will significantly increase the effectiveness and/or operational readiness of the F-14A in countering the threat. These major areas are engine, radar and avionics. This program element provides funding in support of the following specific projects to increase F-14 capability:

(U) Project W0846, Alternate Fighter Engine: Prototype development of the F101 engine, design of aircraft integration, and a flight test program, including Operational Evaluation for aircraft production incorporation in FY 1988.

(U) Project W1408: F-14 Radar Improvement for upgraded fire control/weapon system performance. The effectiveness of the F-14A/AWG-9 weapons control system decreases significantly in mid-1980's due to projected increases in threat performance. These short-falls will be alleviated by the Radar Improvement Program with a

[redacted] These changes will yield significant improvements in electronic countermeasures capability, [redacted] and reliability.

(U) Project W1503: F-14 avionics program for integration of future avionics systems. The F-14's analog avionics limits the ability to accommodate 1980's technology systems, restricts full system utilization and does not allow for future growth. This program brings digital avionics capability to the F-14 in order to obtain maximum operational capability for deployment of the advanced Medium Range Air-to-Air Missile, Airborne Self-Protection Jammer, and the Joint Tactical Information Distribution System.

Program Element: 25667N
DoD Mission Area: 231 - Anti-Air Warfare

Title: F-14A Squadrons
Budget Activity: 4 - Tactical Programs

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project W0846: The F101 Derivative Fighter Engine will be flight tested in the F-14 aircraft. Project W1408 F-14 Radar Improvement: Provides for completion of preliminary design of the Radar Weapon Replaceable Assemblies specification requirements and release of the solicitation for a Full Scale Engineering Deveopment proposal. Evaluation of the Full Scale Engineering Development proposal for contract award by first quarter of FY 1983. Project W1503 F-14 Avionics: Initiate preliminary design study for aircraft integration requirements. Develop specification requirements for aircraft system changes. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Project W1408 and W1503 are new projects in FY 1982. Project W0846 and W1408: the reductions of $27 and $141, respectively, in FY 1982 are a result of inflation adjustments. Project W1503 increase in FY 1982 by $4,994 is a result of additional funds provided by Congress.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	10,228	12,139	15,227	50,910	153,304
W0846	Alternate Fighter Engine	0	10,228	2,020	0	0	77,048
W1408	F-14 Radar Improvement Program	0	0	9,619	15,227	50,910	75,756
W1503	F-14 Avionics	0	0	500	0	0	500

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 25667N
Title: F-14A Squadrons
DoD Mission Area: 231 - Anti-Air Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This Program Element constitutes a requirement for operational improvement of F-14A squadrons in order to counter the projected threat in the mid-1980s and aggregates former related elements as projects under one element. SOR W-16-27 established requirements for very high performance, long endurance aircraft with long range fire control/weapons system capability. The projected threat consists of improved Air Surface Cruise Missiles and launch platforms with extended ranges and increased operating speeds. Improvement of the F-14A in three major areas will significantly increase the effectiveness and/or operational readiness of the F-14A in countering this threat. These major areas are engine, radar and avionics. This program element provides funding in support of the following specific projects to increase F-14 capability: Project W0846 - the F101 Derivative Fighter Engine as an engine alternative, Project W1408 - F-14 Radar Improvement for upgraded fire control/weapon system performance, and Project W1503 - Avionics for incorporation of a digital system.

(U) Project W0846: This program furnishes a solution to the modern fighter engine

and safety of flight deficiencies. The F101 engine also provides improved environmental control system capacity to accommodate future programs without detriment to aircraft stability and control.

(U) Project W1408: Projected threats in late 1980s include longer range supersonic platforms, increased standoff ranges for launching Air-to-Surface Missiles

/ The Radar Improvement Program, which will reduce these deficiencies, will incorporate

In terms of overall system effectiveness, radar improvements provide increases critical to defeat the projected threat.

(U) Project W1503: Because the F-14 was designed with an analog avionics system, programs such the advanced medium range air-to-air missile, joint tactical information distribution system; and airborne self protection jammer cannot collectively be incorporated. This program, through modernization of subsystem components, incorporation of digital technology, and redistribution of space, cooling air and electrical power provides for incorporation and for future system growth. The upgrade will also eliminate single point avionics failures, improve field diagnostic maintenance, and substantially increase the meantime between failure.

(U) RELATED ACTIVITIES: Development of Joint Tactical Information Distribution Systems, (Program Element 25604N) and Airborne Self-Protection Jammer (Program Element 64226N) and the Advanced Medium Range Air-to-Air Missile Program (Program Element 64314N).

(U) WORK PERFORMED BY: Project W0846 - Contractors: General Electric, Lynn, MA; Grumman Aerospace Corporation, Long Island, NY. In-House: Naval Air Propulsion Center, Lakehurst, NJ; Naval Air Test Center, Patuxent River, MD. Project W1408 - Contractors: Hughes Aircraft Company, El Segundo, CA; Grumman Aerospace Corporation, Long Island, NY. In-House: Pacific Missile Test Center,

Program Element: 25667N
DoD Mission Area: 231 - Anti-Air Warfare

Title: F-14A Squadrons
Budget Activity: 4 - Tactical Programs

Pt. Mugu, CA; Naval Air Development Center, Warminster, PA. Project W1503 - Contractors: Grumman Aerospace Company, Long Island, NY; Hughes Aircraft Company, El Segundo, CA. In-House: Pacific Missile Test Center, Pt. Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project W0846: Initiated limited flight test program for F101 engine in a uniquely configured F-14. Project W1408: The general definition of the F-14 Radar operational requirements were derived from two Navy directed studies: The "F-14 Conversion in lieu of Procurement" and the Sea-Based Air Master Study. These studies defined radar alternative configurations and evaluated the effectiveness of each alternative. Project W1503: The Joint Service Operational Requirement was validated in 1978, the Decision Coordinating Paper/Mission Element Need Statement was approved in 1979 and initially funded in February 1979.

2. (U) FY 1982 Program: Project W0846: Completes a limited F-101 flight test and initiates an installation/configuration design study. Project W1408: Complete preliminary design of the AWG-9 weapon replacement assembly and full scale development specification requirements. Project W1503: Conduct limited design/interface study.

3. (U) FY 1983 Planned Program: Project W0846: Not funded. Project W1408: Commence Full Scale Development. Award contract in first quarter of FY 1983 for design and test of engineering development models. Continue engineering design of AWG-9/radar components, test equipment, and software. Assemble brass board units for initial tesing. Project W1503: Not funded.

4. (U) FY 1984 Planned Program: Project W0846: No funded. Project W1408: Continue engineering design of AWG-9 components, build engineering development models and commence laboratory and flight testing. Project W1503: Not funded.

5. (U) Program To Completion: Project W1408: Complete contractor development testing, complete Navy Development Test and Evaluation, and complete Operational Test and Evaluation. Projects W1503 and W0846: Not applicable.

Program Element: 25667N
DoD Mission Area: 231 - Anti-Air Warfare

Title: F-14A Squadrons
Budget Activity: 4 - Tactical Programs

6. (U) Milestones. Project W1408:

		Date
a. Preliminary Design Contract Award	(Jan 1982)*	Mar 1982
b. Full Scale Engineering Development Contract Award	(Oct 1982)*	Nov 1982
c. Contractor Development Testing (Start)		
d. Navy Technical Evaluation		
e. Operational Evaluation		
f. Approval for Service Use		

Projects W0846 and W1503: Not applicable.

* Milestone dates shown in FY 1982 Descriptive Summmary. Changes in milestones e and f reflects restructured program.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25670N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Intelligence Processing Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,317	2,721	1,942	1,809	Continuing	Continuing
W0521	Shipboard Tactical Intelligence Processing	1,317	2,721	1,942	1,809	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This project provides continuing updates to the Intelligence Centers aboard aircraft carriers, amphibious command ships, and amphibious assault ships in order to meet fleet requirements. These include adding anti-submarine warfare and amphibious intelligence to the data base, providing greater flexibility in automatic data processing, and providing more timely intelligence in varied forms/formats to additional users.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete development of line plotter and hardware/software to support RF-14 Tactical Aerial Reconnaissance Pod System. Continue development of data and software to support message handling, support sea control and flag requirements. Commence development of data processing system for utilization by standard Navy shipboard computer based on previously developed design specifications. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The change between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary is due to a reduction of $500 in FY 1982 to accommodate overall reductions to RDT&E,N. Other small downward adjustments in all years are due to changes in inflation indices.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,301	1,329	3,267	1,991	Continuing	Continuing
W0521	Shipboard Tactical Intelligence Processing	1,301	1,329	3,267	1,991	Continuing	Continuing

Program Element: 25670N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Intelligence Processing Support
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
OPN						
Quantity	11,905	10,442	10,072	11,000	Continuing	Continuing
						N/A

Program Element: 25670N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Intelligence Processing Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Potential enemies of the U.S. continue to develop modern, mobile forces which require constant surveillance and knowledge of their whereabouts and capabilities. This type of surveillance permits afloat commanders to optimize resource management and mission execution. The Aircraft Carrier Intelligence Center, a subsystem of the Naval Intelligence Processing System, became operational in 1962 to provide and maintain the intelligence required by the operational commander. Since fleet introduction in 1962, the Aircraft Carrier Intelligence Center has had little developmental improvement while commanders' demands for more and better intelligence have caused the Aircraft Carrier Intelligence Center's data base to expand ten-fold to 80 million characters to accommodate not only strike warfare information, but also anti-submarine warfare and amphibious intelligence. Concurrent with data base expansion have come requirements to provide more timely intelligence in varied forms/formats to additional users throughout the task group as well as aboard the flagship. Multiple developments are required to satisfy these requirements and to maintain state-of-the-art performance in the Intelligence Centers. These developments include hardware, software and system developments oriented to the threat at sea.

(U) RELATED ACTIVITES: Marine Corps Command/Control/Communication System, Program Element 26626M, project C0062, Marine Air/Ground Intelligence System, uses same basic data and similar sensor analysis as in the Aircraft Carrier Center. A close working relationship has been established with the Marine Air/Ground Intelligence System project to assure compatibility and non-duplication of development effort.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Engineering Activity Detachment, Philadelphia, PA; Naval Surface Weapons Center, Dahlgren, VA. Contractors: Planning Research Corporation, McLean, VA; Aeronutronic-Ford, Palo Alto, CA; Martin Marietta, Denver, CO.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed development of on-line data retrieval system, improved film viewer/printer, EA-6B collection data analysis software, Compartmented Mode Processing System, photographic "chip" copy camera, Phase III data base design, fiber optic system for evaluation, new data terminal photo interpretation systems, Naval Intelligence Processing System communication requirements study, data base for Naval Intelligence Processing System (change 15) and Compartmented Mode Processing System, F-14 reconnaissance pod readout high volume disk storage and extended case memory unit and EA-6B readout. Started development of a line-drawing plotter to replace the 17-year old plotter presently installed in aircraft carriers and software and data base to support message handling. Developed software for use with the AS-27A photo interpretation system; performed test and evaluation of computer programs to use a new intelligence data base (Baseline 80); developed a change to the alpha-numeric terminals to display graphic data.

2. (U) FY 1982 Program: Continue development of line plotter, software, and data base to support message handling. Develop hardware/software to support RF-14 Tactical Aerial Reconnaissance Pod System; continue development of software and data base to support sea control and flag requirements. Determine design specifications for utilization of standard Navy shipboard computer.

Program Element: 25670N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Intelligence Processing Support
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Complete plotter development and hardware/software to support RF-14 Tactical Aerial Reconnaissance Pod System. Continue development of software and data base to support message handling, sea control and flag requirements. Commence development of update to Naval Intelligence Processing System based on design specifications using standard Navy shipboard computer.

4. (U) FY 1984 Planned Program: Continue development of software and data base to support message handling, sea control and flag requirements, and development of data processing system based on standard Navy shipboard computer. Commence development or adapt off-the-shelf new graphic display capability. Provide necessary testing and changes to provide Joint Interoperability of Tactical Command and Control System capability to the intelligence system.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25674N
Title: Electronic Warfare Counter Response
DoD Mission Area: 372 - Escort, Stand-Off & Counter-C3
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9,050	10,586	12,653	15,868	Continuing	Continuing
W0556	Electronic Warfare Counter Response	9,050	10,586	12,653	15,868	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Funds the continuing development of electronic warfare equipment for tactical support aircraft (EA-6B) to provide improved countermeasures response to new generation threat emitters.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Commence full scale development of Advanced Capability system. Commence full scale development of[redacted] transmitter. Begin ALQ-149 Tactical Communication Jammer integration. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are the result of refined estimates of development cost and escalation as follows: FY 1981 $1,260 increase and the FY 1982 -$197 and FY 1983 -$462 reductions are a result of economic and budget adjustments.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	28,406	7,790	10,783	13,115	Continuing	Continuing
W0556	Electronic Warfare Counter Response	28,406	7,790	10,783	13,115	Continuing	Continuing

Program Element: 25674N
DoD Mission Area: 372 - Escort, Stand-Off & Counter-C3

Title: Electronic Warfare Counter Response
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy	200,710	244,300	300,200	299,500	859,900	1,904,210
Quantity	(6)	(6)	(6)	(6)	(6)	(22)

Program Element: 25674N Title: Electronic Warfare Counter Response
DoD Mission Area: 372 - Escort, Stand-Off & Counter-C3 Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Provides for the continued development of Electronic Warfare equipment for tactical support aircraft (EA-6B) to provide improved countermeasures response to new generation threat emitters. This will be accomplished by continuing development and testing of an evolutionary update to the on-board system. This program also provides for integration of other updates to the EA-6B such as ALR-67, ALQ-126, Joint Tactical Integrated Data Systems and Geographical Positioning System. The EA-6B Weapon System was designed for airborne jamming of enemy radars associated with Surveillance, Anti-Aircraft Artillery, Surface-to-Air Missiles, and command and control systems associated with Ground Control Intercept. The EA-6B will support carrier and advanced based tactical aircraft operating in a dense, radar-controlled, anti-aircraft environment with the inherent flexibility and growth potential to maintain a significant advantage through the 1980's.

(U) RELATED ACTIVITIES: Air Force EF-111 Program which incorporates a variant of the ALQ-99 tactical jamming system.

(U) WORK PERFORMED BY: Grumman Aerospace Corporation, Bethpage, NY; Airborne Instrument Laboratory, Long Island, NY; Raytheon Corporation, Goelta, CA; Control Data Corp., Minneapolis, MN. Litton Amecon, College Park, MD; Teledyne Systems, Northridge, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed Development and Technical Evaluation and deployment of basic EA-6B aircraft. Expanded Capability EA-6B system developed and deployed. Initiated efforts on Radar Warning Receiver development. Improved Capability EA-6B system developed and deployed. Commenced integration of ALR-67 Radar Warning Receiver and Band 9/10 Jammer development. Advanced Capability investigation of follow-on improvements to the receiver/processor system initiated. Improved Capability - Phase II development completed and flight tests begun.

2. (U) FY 1982 Program: Improved Capability - Phase II Technical Evaluation and Operational Evaluation planned. Conduct flight test of Advanced Development Model of transmitter. Complete ALR-67 testing. Initiate Advanced Capability risk reduction phase.

3. (U) FY 1983 Planned Program: Commence production deliveries for Improved Capability Phase II aircraft. Commence full scale development of Advanced Capability system. Commence full scale development of transmitter. Begin ALQ-149 integration.

4. (U) FY 1984 Planned Program: Continue Advanced Capability receiver and transmitter development. Flight test ALQ-149 integration.

5. (U) Program to Completion: This is a continuing development program to improve Electronic Warfare equipment and capabilities.

Program Element: 25674N Title: Electronic Warfare Counter Response
DoD Mission Area: 372 - Escort, Stand-Off & Counter-C3 Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

		Date
Commenced Improved Capability - Phase II Development		Aug 1978
Navy Preliminary Evaluation (NPE)		November 1980
Electro-Magnetic Interference Testing	(January 1981)*	July 1981
Provisional Approval for Service Use (Limited Production)	(July 1981)*	November 1981
Technical Evaluation	(July 1981)*	October 1981
Operational Evaluation	(October 1981)*	
Approval for Service Use		
Follow-on Test and Evaluation		

*Dates in parentheses are milestones shown in FY 1982 Program Element Descriptive Summary. Delay of six months in delivery of preproduction exciters resulted in initial schedule slip. Correction of all hardware/software major discrepancies discovered during Navy Preliminary Evaluation/Initial Operational Test and Evaluation prior to Technical Evaluation delayed Technical Evaluation until October 1981.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 25675N
Title: Operational Reactor Development
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	2,344	2,855	3,397	Continuing	Continuing
S1303	Operational Reactor Development	0	2,344	2,855	3,397	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides for testing, evaluating, modifying and improving components and systems in operating reactor plants.

(U) BASIS FOR FY 1983 RDT&E REQUEST: General engineering support will be provided to resolve problems affecting shipboard reactor plant operation in the areas of primary plant systems and instrumentation and control systems. Plant analysis work will be provided as required. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive summary are as follows: the decrements in the FY 1982 and FY 1983 funding estimates ($1 and $100, respectively) are the result of a downward adjustment of the inflation factors for both fiscal years.

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	2,345	2,955	Continuing	Continuing
S1303	Operational Reactor Development	0	0	2,345	2,955	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 25675N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Operational Reactor Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element was a new start program for FY 1982 and consists of work previously planned and approved under Program Element 63501N, Reactor Propulsion Plants. The element provides for testing, evaluating, modifying and improving components and systems in operating reactor plants. This effort is necessary to ensure the continued safe and reliable operation of naval nuclear propulsion plants.

(U) RELATED ACTIVITIES: Work conducted under this element is closely coordinated with other naval nuclear propulsion research and development projects and the Department of Energy, Office of the Deputy Assistant Secretary for Naval Reactors, research and development work on nuclear reactors.

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

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Not applicable.

2. (U) FY 1982 Program: Conduct general engineering efforts to resolve problems affecting shipboard reactor plant operation and in support of primary plant reactor systems. Analyze operational data from nuclear powered ships in order to develop improved designs for fluid mechanical systems and plant arrangements. Perform engineering design effort for reactor control and electrical instrumentation equipment modifications, Post Shakedown Availabilities, and resolution of emergent problems. These efforts are required for modifications to existing plants in support of advanced core applications.

3. (U) FY 1983 Planned Program: Continue to conduct general engineering efforts to resolve operating reactor plant problems through the utilization of operational data obtained from nuclear powered ships. Continue to perform engineering design effort for reactor control and electrical instrumentation equipment modifications, Post Shakedown Availabilities, and resolution of emergent problems.

4. (U) FY 1984 Planned Program: Continue general engineering efforts in the following areas:

- o Technical problems affecting shipboard reactor plant operation.
- o Reactor control and electrical instrumentation equipment modifications.
- o Post Shakedown Availabilities for nuclear powered ships.

o Fluid mechanical systems and plant arrangements.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 26313M
Title: Marine Corps Telecommunications
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,247	1,713	2,266	3,029	Continuing	Continuing
C0040	Satellite Communications Equipment	12	206	149	149	Continuing	Continuing
C0043	Landing Force Integrated Communications System Implementation (LFICS)	82	513	566	1,087	Continuing	Continuing
C0044	Electromagnetic Compatibility Analysis Center Support of the Marine Corps (ECAC)	78	190	134	152	Continuing	Continuing
C0048	Transmission Subsystems Improvements (TSI)	1,093	804	1,417	1,641	Continuing	Continuing
C0053	Joint Tactical Information Distribution System	5	*	*	*	*	*
C1074	Digital Communication Terminal	977	-	-	-	-	8,179

* Funded in PE64719M, Command Control and Communications System in FY 1982 and beyond.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: 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 Office. 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.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue to monitor, test and evaluate other Service developments in tactical satellite communications terminals. Identify and correct deficiencies and problems in tactical communication systems to ensure interoperability and overall communications improvements. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Satellite Communications Equipment: FY 1981 funding increase of 13 was required to continue the program after an incremental funding realignment. Landing Force Integrated Communication System Implementation: FY 1981 funding increase of 82 was required to continue the program after an incremental funding realignment. Electromagnetic Compatibility Analysis Center: FY 1981 funding of 78 was required to continue the program after an incremental funding realignment. Transmission Subsystems Improvements: FY 1981 actual increase of 839 above the estimate is due to the identification of additional R&D tasks; FY 1983 increase of 657 above the FY 1982 Descriptive Summary level is due to increased costs and scope of efforts in multichannel communications systems development work. All other increases/decreases are attributable to inflation/escalation index changes and program cost refinements.

Program Element: 26313M
DoD Mission Area: 345 - Tactical Communications

Title: Marine Corps Telecommunications
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional Estimate	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,495	361	1,733	1,635	Continuing	Continuing
C0040	Satellite Communications Equipment	118	-	208	153	Continuing	Continuing
C0043	Landing Force Integrated Communication System Implementation	303	-	519	584	Continuing	Continuing
C0044	Electromagnetic Compatability Analysis Center Support of the Marine Corps	34	-	192	138	Continuing	Continuing
C0048	Transmission Subsystems Improvements	601	254	814	760	Continuing	Continuing
C0053	Joint Tactical Information Distribution System	134	*	*	*	*	*
C1074	Digital Communications Terminal	1,305	107	-	-	-	7,309a/

* Funded in PE 64719M, Command, Control and Communications System in FY 1981 and out.

a/ Total estimated cost column includes operational test and evaluation funds in the amount of $493,000. Such funds are provided under PE 65156M, Marine Corps Operational Test and Evaluation. This is to procure 54 equipments for Development and Operational testing.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Procurement, Marine Corps						
Satellite Communications Equipment						
Terminal AN/TSC-93A (Telecommunications)	2,950	1,847	4,020	-	-	TBD
(Quantity)	(6)	(2)	(7)	-	-	TBD
Satellite Communications Terminal AN/TSC-85A (Telecommunications)	1,337	1,653	1,535	-	-	TBD
(Quantity)	(1)	(1)	(1)	-	-	TBD

Program Element: 26313M
LOD Mission Area: 345 - Tactical Communications

Title: Marine Corps Telecommunications
Budget Activity: 4 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Transmission Subsystem Improvement						
Vinson Installation Kit (Telecommunications)	1,474	7,214	6,160	-	-	TBD
(Quantity)	(1,159)	(3,530)	(2,232)	-	-	TBD
Radio Set	0	7,504	-	-	-	9,200
(Quantity) AN/GRC-UHF	0	(337)	-	-	-	(385)
AN/PRC-104	-	2,417	110	-	TBD	TBD
(Quantity)	-	(200)	(8)	-	TBD	TBD
AN/MRC-138	-	2178	146	-	TBD	TBD
(Quantity)	-	(58)	(3)	-	TBD	TBD
Digital Communications Terminal						
AN/PSC-2	-	8,969	17,842	55,371	105,551*	187,733
(Quantity)	-	(390)	(596)	(1,717)	(3,001)	(5,704)

* Through FY 1986 only

Program Element: 26313M
Title: Marine Corps Telecommunications
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Satellite Communication Equipment: This project will develop tactical Ultra High Frequency and Super High Frequency satellite communications terminals for the Fleet Marine Forces. Landing Force Integrated Communications: This project will provide guidance for future communication equipment development, and ensure complete compatibility of Marine Corps communication equipment with Joint Tactical Communication Office development systems. Electromagnetic Compatibility Analysis Center: Electromagnetic Compatibility Analysis Center will be tasked to provide electromagnetic compatibility support for one-time efforts not related to other programs/projects requiring Electromagnetic Compatibility Analysis Center Support. Transmission Subsystems: This project will develop new items in the areas of radio, wire and communications security equipment. Digital Communications Terminal: This project will develop a hand held message entry/receive device to be employed with existing transmission equipments.

(U) RELATED ACTIVITIES: U.S. Marine Corps project Tactical Satellite Communications Equipment is related to Navy PE 33109M Satellite Communications; Army PE 33142A, Satellite Communication Ground System and Air Force Program Element 63431F, Advance Space Communications. The Navy equipment was shelterized for use in the field and the Army project is being monitored and influenced to ensure USMC requirements are met. U.S. Marine Corps project Transmission Subsystems is related to Navy PE 33401M, Communication Security. The U.S. Marine Corps is participating jointly with each of the other Services and NSA in developing secure voice equipment.

(U) WORK PERFORMED BY: In-house: Electromagnetic Compatibility Analysis Center, Annapolis, MD; Naval Ocean Systems Center, San Diego, CA; Naval Avionics Facility, Indianapolis, IN; Naval Electronics System Security Engineering Center, Washington, D.C.; Contractors: Cincinnati Electronics Company, Cincinnati, OH; Hughes Aircraft, Fullerton, CA; Magnavox Company, Fort Wayne, IN; Litton Data Systems, Van Nuys, CA; National Security Agency, Fort Meade, MD; Harris Corporation, Rochester, NY; Collins Radio Group, Cedar Rapids, IA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Participated with the Army in the development of a backpack and Super High Frequency multichannel satellite terminal. Participated in the development of Time Division Multiple Access Models for use with Ultra High Frequency/Super High Frequency Satellite Terminals. Evaluated New Antenna Systems for the Satellite Communications System, AN/TSC-96, and fabricated a Naval Modular Automated Communications System terminal for the Fleet Satellite Communication System. Continued efforts to modify Communications-Electronics equipment to ensure compatibility with those being developed under the auspices of the Joint Tactical Communications Office. Completed system integration testing of the AN/TTC-5, Mobile Automatic Digital Network Terminal. Completed an urgent High Frequency requirement for a Defense Network Terminal. Completed an urgent High Frequency requirement for a Defense Communication System entry. Completed Milestone III (Approval for Service Use) of a Helicopter Command, Control, Communications Center (HC4) which includes Very High Frequency and Ultra High Frequency radios and related communications Security equipment. Fabricated and completed testing for an Automated Message Entry System. Continue development of a pre-selector remote for use with the new family of High frequency radios and modification of the Radio Set Control Group (AN/GRA-39), for use with the High Frequency family of radios. Continued to monitor Very High Frequency

radios and Ultra High Frequency family of radios. The Digital Communications Terminal was removed from Project C0043 and Project C1074 was assigned for purposes of visibility prior to awarding a contract for full scale engineering development. Entered production phase of testing and evaluation of a standard combat radio microphone for use with all tactical radios that operate in a high noise environment. Completed testing and evaluation of a secure voice installation for tracked vehicles. Defined Marine Corps requirement and concepts of employment for the Joint Tactical Information Distribution System. Completed development and entered production phase of Transportable ultra-high frequency radio. Initiated a program for a portable ultra-high frequency radio set.

2. (U) FY 1982 Program: Participate in development of Anti-Jam Control Modem for Super High Frequency Multi-Channel Satellite Communications Terminals. Efforts will continue to ensure compatibility with equipment developed under the aegis of the Joint Tactical Communications Office. Analysis of Ultra High Frequency (ground and airborne) Communications links within a Marine Amphibious Force will be conducted. Commence fielding the manpack versions of a new family of High Frequency Radios and conduct Development and Operational Testing on other configurations. Monitor and participate in evaluation of tactical secure voice equipment of other services and the National Security Agency. Continue to monitor the Army's Single Channel Air Ground Radio system and the Joint Tactical Communications Office Advance Narrow Band Voice Terminal and other Communications Security efforts. Continue development of a Digital Wideband Transmission System and monitor efforts to provide a Ground-to-Air Radio. Full Scale Engineering Development of the Digital Communications Terminal continues. Conduct Milestone II, approval for service use.

3. (U) FY 1983 Planned Program: Participate and monitor the Ground Mobile Force and Navy follow-on Extremely High Frequency Satellite programs. Conduct Development and Operational Testing of the Time Division Multiple Access modem. Continue with existing communications electronics modifications and efforts to ensure Marine Corps developments are compatible with equipments being developed under the auspices of the Joint Tactical Communications Office. The Electronic Compatibility Analysis Center continues to provide general Electromagnetic Compatiblity support to the Marine Corps. Test, evaluate, and Approve for Service Use a Digital Wide Band Transmission System and Ultra High Frequency Radio developments. Continue development and testing of the portable ultra-high frequency radio. Initiate low rate of initial production for the digital communications terminal and proceed into full scale production.

4. (U) FY 1984 Planned Program: Continue to monitor, test and evaluate other Service developments in tactical satellite Communications terminals. The Electromagnetic Compatibility Analysis Center continues to provide general support to the Marine Corps. Refinement of Landing Force Integrated Communications Systems will evolve into a dynamic real-time computer model responsive to fiscal, development pace, scenario and system engineering perturbations. Continue to monitor Very High Frequency and Communications Security developments and digital wideband transmission system programs. Conduct Milestone III (Approval for Service Use) of portable ultra-high frequency radio. Project C0043 Landing Force Integrated Communications System Implementation: The increase of $521 between FY 1983 and FY 1984 is due to the planned initiation of a network modeling effort.

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

Program Element: 26313M
DoD Mission Area: 345 - Tactical Communications

Title: Marine Corps Telecommunications
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	IOC
Satellite Communications Equipment	FY 81 (UHF)
Transmission Subsystems Improvements	FY 84 (SHF)
	IOC
Digital Wideband Transmission System	FY 1986
Ultra High Frequency Radio	FY 1984
	ASU
Portable Ultra High Frequency Radio	FY 1984
	IOC
Digital Communications Terminal	FY 1984

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 26623M
DoD Mission Area: 212 - Indirect Fire Support

Title: Marine Corps Ground Combat/Supporting Arms (Operational Systems)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,583	1,635	3,093	9,289	Continuing	Continuing
C0018	Artillery Computer System	3	-	*	658	TBD	TBD
C0019	Landing Vehicle Tracked (LVTP7) Product Improvement	453	-	-	-	-	5,728
C0021	Landing Vehicle Tracked-7A1	-	-	-	2,848**	TBD	TBD
C0061	Battlefield Surveillance Devices	-	-	-	305**	TBD	TBD
C0085	Amphibious Reconnaissance Equipment	247	109	747	791	Continuing	Continuing
C1120	Air Defense Missile Systems	880	1,526	2,346	4,687	Continuing	Continuing

* Funded in PE 64657M Ground Combat/Supporting Arms Systems (Engineering) in FY 1983.
** FY 1984 funds for C0021 Landing Vehicle Tracked-7A1, 2848, are described in PE 64657M, Marine Corps Ground Combat/Supporting Arms Systems (Engineering). C0061, Battlefield Surveillance Devices, 305, is included in PE 64718M, Marine Corps Intelligence/ Electronic Warfare Systems (Engineering).

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides funds to ensure that modifications, improvements and actions in response to field identified discrepancies are developed for existing ground combat and supporting arms weapons and equipment.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To develop improvements and investigate modifications/replacements for existing weapons and equipment. This includes fabrication and testing. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the program element funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary result from refinement of cost estimates including escalation and an increase in subprojects under Amphibious Reconnaissance Equipment project. FY 1983 program element increase of 533 is due to software development, program documentation and preparation for operational testing. Landing Vehicle Tracked (LVTP7) Product Improvement: Concluded with the FY 1981 effort. Future product improvements are included in the LVT7A1 program efforts. Amphibious Reconaissance Equipment: FY 1981 increase of 153 and FY 1983 increase of 614 are due to new equipment projects. Air Defense Missile Systems: FY 1981 decrease of 288 is due to other service participation and refinement of costs. M16A1 Rifle Product Improvement: Concluded with FY 1980 effort. All other changes are due to refinements in estimates of cost including escalation.

Program Element: 26623M
Title: Marine Corps Ground Combat/Supporting Arms (Operational Systems)
DoD Mission Area: 212 - Indirect Fire Support
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	880	1,796	1,655	2,560	Continuing	Continuing
C0018	Artillery Computer System	-	80	-	-	Continuing	Continuing
C0019	Landing Vehicle Tracked (LVTP7) Product Improvement	324	454	-	-	-	5,729
C0085	Amphibious Reconnaissance Equipment	110	94	109	133	Continuing	Continuing
C1120	Air Defense Missile Systems	317	1,168	1,546	2,427	Continuing	Continuing
C1437	M16-A1 Rifle Product Improvement	129	-	-	-	-	129

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Procurement, Marine Corps							
C1120	Air Defense Missile Systems						
	Improved HAWK	24,987	80,068	75,413	50,368	Continuing	Continuing
	Improved HAWK (Modification)	200	23,443	20,747	15,061	Continuing	Continuing
	Stinger Missile System	30,700	38,900	115,593	115,659	Continuing	Continuing
	(Quantity)	(271)	(488)	(1,560)	(1,440)	TBD	TBD
C0019	LVTP7 Product Improvement*						
	(Quantity)						
C0085	Amphibious Reconnaissance Equipment						
	Inflatable Boat, Small	-	-	588	232	Continuing	Continuing
	(Quantity)	-	-	TBD	TBD		

* Procurement funds are associated with C0021 Landing Vehicle Tracked-7A1, and are reflected in PE 64657M, Marine Corps Ground Combat/Supporting Arms Systems (Engineering).

Program Element: 26623M
Title: Marine Corps Ground Combat/Supporting Arms (Operational Systems)
DoD Mission Area: 212 - Indirect Fire Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Air Defense Missile Systems: This project will provide funds to develop improvements for the Improved HAWK (I HAWK) Missile System and the STINGER Missile System. Continuing efforts will be conducted to find a replacement system for the Improved HAWK that will effectively counter the postulated air-supported weapons threat of the 1985-2000 time frame. Amphibious Reconnaissance Equipment: This project will test and evaluate off-the-shelf equipment and monitor other Service programs relating to land and amphibious reconnaissance equipment and techniques.

(U) RELATED ACTIVITIES: The projects within this program relate to all similar existing and developing systems.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA; Marine Corps Tactical System Support Activity, Camp Pendleton, CA; Naval Electronics Systems Command, Washington, D.C.; U.S. Army Missile Command, Redstone Arsenal, AL; Naval Sea Systems Command, Washington, D.C.; Naval Coastal Systems Center, Panama City, FL; Contractors: Raytheon Company, Bedford, MA; General Dynamics, Pomona, CA; Brunswick Corporation, Costa Mesa, CA; FMC Corporation, San Jose, CA; Naval Weapons Center, China Lake, CA; Litton Industries, Van Nuys, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: STINGER passed Defense Systems Acquisition Review Council III and obtained Secretary of Defense approval for service use. Passive Optical Seeker Technique engineering development is underway. Stinger Launch Simulator (STLS) development and testing has been completed and Stinger Launch Simulator has been approved for service use. Operational testing of the Target Adjustment System was completed during 1981. Continue modification and test of design and material for Inflatable Boat Small/Silenced Propulsion System. Work on waterproof bag continued. Evaluation of off-the-shelf ram air parachutes continued.

2. (U) FY 1982 Program: Continue the search for Improved HAWK replacement. Continue engineering development and testing on STINGER Passive Optical Seeker Technique. Conduct operational test of Early Warning Pointing Device for STINGER. Complete development of waterproof bags. Complete evaluation of ram air parachutes. Develop a lightweight material to fabricate the Marine Amphibious Reconnaissance System (MARS).

3. (U) FY 1983 Planned Program: Evaluate Improved HAWK RAM mode/computer update. Attempt to identify Improved HAWK replacement. Continue development on STINGER Passive Optical Seeker Technique. Monitor and test prototypes of the Small Unit Navigation System (SUNS). Begin procurement of the Marine Amphibious Reconnaissance System (MARS).

Program Element: 26623M
DoD Mission Area: 212 - Indirect Fire Support

Title: Marine Corps Ground Combat/Supporting Arms (Operational Systems)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue Passive Optical Seeker Technique development. Continue efforts to identify a Small Unit Navigation System. The increase in project C1120, Air Defense Missile Systems, from FY 1983 to FY 1984 is due to expanded development effort in the Mobile HAWK program to include testing of the multi-function radar concept.

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

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 26624M
DoD Mission Area: 215 -Land Warfare Support

Title: Marine Corps Combat Services Support (Operational Systems)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	407	368	376	657	Continuing	Continuing
C0076	Combat Service Support Product Improvement	167	254	219	303	Continuing	Continuing
C0084	Marine Corps Combat Clothing and Equipment	236	108	115	123	Continuing	Continuing
C0869	Camouflage Technology	4	6	42	231	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Research, Development, Test and Evaluation (RDT&E) funds will provide for the product improvement of engineering survey sets, office machines, earth moving equipment, tool sets, and maintenance shops. State-of-the-art of advancement in individual clothing, equipment, and camouflage hardware and techniques will be monitored. The current equipment will be modified as appropriate.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Efforts from previous years in the areas of Combat Service Support, clothing and equipment, and camouflage product improvement will be continued. New industry equipments and materiels need to be tested and evaluated for Marine Corps use as part of economic analyses to determine most cost effective product improvements. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are the result of refined estimates of cost including escalation. Combat Service Support Product Improvement: FY 1981 decrease of 62 is due to late start of an evaluation of engineering tools, kits and shop sets for potential product improvement.

Program Element: 26624M
DoD Mission Area: 215 -Land Warfare Support

Title: Marine Corps Combat Services Support (Operational Systems)
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	234	470	371	387	Continuing	Continuing
C0076	Combat Service Support Product Improvement	184	229	257	226	Continuing	Continuing
C0084	*Marine Corps Combat* Clothing and Equipment	48	237	108	118	Continuing	Continuing
C0869	Camouflage Technology	2	4	6	43	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS:

Procurement, Marine Corps		FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0076	Combat Service Support Product Improvement						
	Shop Set No. 3		1,555	154			1,709
	(Quantity)		(54)	(7)			(61)
	Theodolite Survey Set		97				97
	(Quantity)		(30)				(30)
	Artillery Survey Set	1,048					1,048
	(Quantity)	(21)					(21)
	Lithography Duplicator		486		289		Continuing
	(Quantity)		(110)		(58)		TBD
	Duplicating Machine Offset						Continuing
	(Quantity)						TBD
	Survey Set, Topographic				1,005		1,005
	(Quantity)				(4)		(4)

Program Element: 26624M
DoD Mission Area: 215 -Land Warfare Support

Title: Marine Corps Combat Services Support (Operational Systems)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Combat Service Support Product Improvement: This project encompasses the improvement to existing combat engineer tool kits, shop sets and vans for Life Cycle extension and incorporation of available state-of-the-art capabilities. Marine Corps Combat Clothing and Equipment: Selected Army-developed items will be procured for individual testing in the Fleet Marine Forces. RDT&E funds will be provided to the Army Labs for unilateral and joint development of cold weather clothing, combat boots, and individual and team tents. Camouflage Technology: U.S. Army efforts in hardware and concept developments will be monitored and test items will be procured as funds become available for evaluation by Fleet Marine Force units. Techniques for camouflage of Marine Corps unique equipment will be explored including use of decoys.

(U) RELATED ACTIVITIES: Combat Service Support Product Improvement: U.S. Army Air Mobility Research and Development Laboratory efforts Program Element (PE 64204A) with helo slings; U.S. Naval Civil Engineering Laboratories efforts (PE 63719N) in Material Handling Equipment for Amphibious Logistics Support Ashore; Mobility Equipment R&D Command joint development of forklift modifications (PE 64713A). Marine Corps Combat Clothing and Equipment: Natick Laboratories developments in fabric/webbing material (PE 62723A); Joint Service efforts on the "Battledress Uniform" (PE 64713A). Camouflage Technology: Monitoring of Natick Laboratories efforts in visual signature reduction (PE 64713A).

(U) WORK PERFORMED BY: In-House: In all matters performed by Marine Corps Development and Education Command, Quantico, VA, Combat Service Support Product Improvement: Main Laboratory, Naval Civil Engineering Lab, Port Hueneme, CA; Clothing and Equipment, U.S. Army Natick Laboratories, Natick, MA; Camouflage Laboratory, Mobility Engineering Research and Development Command, Fort Belvoir, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Combat Service Support Product Improvement: An analysis of the capability of the Engineer General Purpose Repair Shop Set and organizational Shop Set to support the current Marine Corps Combat Service support concept was begun. A mechanical document destructor was evaluated for adoption by the Fleet Marine Force. Updated components of the Geodetic/Topographic Survey Set were tested. Clothing and Equipment: Items of Canadian and Norwegian cold weather equipment continued to be tested on USMC operations. The Marine Corps participated in joint testing of the new Combat Boot. State-of-the-art commercial designs in individual tents were evaluated. Camouflage Technology: Efforts of the U.S. and Swedish Armies to develop camouflage techniques were monitored. Studies of industry camouflage techniques suitable for unique Marine Corps equipment were continued.

Program Element: 26624M
DoD Mission Area: 215 -Land Warfare Support

Title: Marine Corps Combat Services Support (Operational Systems)
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Combat Service Support Product Improvement: Product improvement of Combat Engineering tool kits and Mobile Shop Vans will continue to replace worn out and outdated equipment and components. Engineer Survey Set prototype component testing will be completed. Commercial classified document (tape and microfiche) destructors and Geodetic/Topographic Survey Sets components testing will be completed. Clothing and Equipment: Testing of the new Combat Boots will be continued. Testing of military applications of one man tent designs and cold weather clothing by Natick Laboratories will continue. Various items of cold weather equipment will continue to be evaluated. Camouflage Technology: The state-of-the-art in camouflage will be monitored and test items will be procured as funds become available; unique Marine Corps equipment camouflage will be pursued with industry and U.S. Army Laboratories.

3. (U) FY 1983 Planned Program: Combat Service Support Product Improvement: Adaptive measure for diesel fuels will begin along with the adaptive measures for containership shipping and subsequent field operations ashore for all equipments. Clothing and Equipment: The new Individual Shelter testing will be completed. Prototype items of cold weather clothing will be fielded for testing. Camouflage Technology: The state-of-the-art of camouflage will be monitored and test items procured as funds become available.

4. (U) FY 1984 Planned Program: The programs as previously outlined in FY 1981-1983 will be continued in consonance with outyear exigencies. The total program increase of 281 between FY 1983 to FY 1984 is due to an 84 increase for procurement of state-of-the-art hydrophonic survey equipment for evaluation in project C0076 and 189 increase in project C0869 for investigation of the use of decoys and improved means to conceal or disguise individuals and equipment.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 26625M Title: Marine Corps Intelligence/Electronics Warfare Systems (Operational Systems)

DoD Mission Area: 374-Multimission, Technology and Support Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	471	0	779	590	Continuing	Continuing
C0060	Forward Pass	*	*	779	590	Continuing	Continuing
C1068	Signal Intelligence Product Improvement Program	383	-	-	-	Continuing	Continuing
C1648	Intelligence Equipment Support	88	-	-	-	-	88

* Forward Pass, C0060 is funded in FY 1981 and FY 1982 in Program Element 64718M, Intelligence/Electronic Warfare Systems.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides RDT&E funds for the operational systems development of Marine Corps intelligence warfare equipment and systems required for the support of operating forces.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funding for the Signal Intelligence Product Improvement project was transferred to the National Security Agency program element 35885G, Tactical Cryptologic Program in FY 1982. Forward Pass will be modified to facilitate interface with the Remotely Monitored Battlefield Sensor System. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Forward Pass: FY 1983 decrease of 25 is due to a refinement of cost estimates; Intelligence Equipment Support: FY 1981 increase of 88 is due to transfer of funds from project C0032 Management Support Marine Corps, PE 65854M, Development Center Support. This project was completed in FY 1981 and will not be funded in the future.

Program Element: 26625M Title: Marine Corps Intelligence/Electronics Warfare Systems (Operational Systems)

DoD Mission Area: 374-Multimission, Technology and Support Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	414	383	-	804	Continuing	Continuing
C0060	Forward Pass	-	-	-	804**	Continuing	Continuing
C1068	Electronic Warfare Equipment Product Improvement	380	383	-	-	Continuing	Continuing
C1069	Sensor Product Improvement	34	-	-	-	Continuing	Continuing

** Transferred from 64718M, Marine Corps Intelligence/Electronics Warfare Systems in FY 1983.

Program Element: 26625M Title: Marine Corps Intelligence/Electronics Warfare Systems (Operational Systems)

DoD Mission Area: 374-Multimission, Technology and Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: A continuing requirement exists to provide a quick response to field-identified deficiencies and research-supported improvements to existing electronic warfare and sensor equipments. This program develops modifications and improvements to existing items of hardware and provides quick action on both Unsatisfactory Equipment Reports and modifications to operational systems.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-house: Naval Surface Weapons Center, Dahlgren, VA. Contractors: N/A

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Evaluated the feasibility of product improving direction finding equipment. Product improved and tested the AN/TSQ-54A (Heavy Intercept Facility) and improvement of the AN/TSQ-103 (Light Intercept Facility). Began product improvement of the AN/TSQ-68A (Transcription/Translation Facility).

2. (U) FY 1982 Program: Signal Intelligence Product Improvement: Complete product improvement of AN/TSQ-103 (Light Intercept Facility). Conduct operational test of AN/TSQ-103 (Light Intercept Facility) product improvement. Complete improvement of the AN/TSQ-68A (Transcription/Translation Facility), and the AN/TSQ-88 (Light Signals Monitor Facility).

3. (U) FY 1983 Planned Program: Funds for the Signal Intelligence Product Improvement were transferred to the National Security Agency, 35885G, Tactical Cryptologic Program. Forward Pass: Modification of Forward Pass to facilitate interface with the Remotely Monitored Battlefield Sensor System (REMBASS), C1297, in Program Element 63730M, Marine Corps Intelligence/Electronic Warfare Systems (Advanced).

4. (U) FY 1984 Planned Program: Forward Pass: Continue modification to facilitate interface with Remotely Monitored Battlefield Sensor System (REMBASS), C1297 in PE 63730M, Marine Corps Intelligence/Electronic Warfare Systems (Advanced).

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 26626M

Title: Marine Corps Command/Control/Communications Systems (Operational Systems)

DoD Mission Area: 351-Land Warfare

Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,091	12,194	18,447	24,240	Continuing	Continuing
C0045	Tactical Systems Inter/Intraoperability Program	1,173	1,777	3,798	7,800	Continuing	Continuing
C0062	Intelligence Analysis Center Product Improvement Program	1,881	1,400	1,964	1,778	Continuing	Continuing
C0103	Marine Air Command and Control System Operational Development	3,235	4,703	7,113	7,859	Continuing	Continuing
C1066	Ground Radar Product Improvement	2	109	-	-	Continuing	Continuing
C1067	Aviation Radar Product Improvement	1,800	4,205	5,572	6,803	Continuing	Continuing

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

(U) BASIS FOR FY 1983 RDT&E REQUEST: To develop modifications that will correct field-identified discrepancies on existing systems. Continue the evaluation and testing of all Marine Air Command and Control System identified prototype modifications to ensure Marine Air Command and Control System inter/intraoperability and integration. The increase in funding of $6253 from FY 1982 to 1983 is due to establishing a funding line to support a systems engineering group and an approved Marine Integrated Fire and Air Support System Engineering Change Proposal (+$2021), revised program estimates in project C0103 (+$2410), the continued development of the TAOC-85/TPS-59 interface, the continued development of Set 15 for the AN/TPS-59 and HAT-100 for the AN/TPS-32 Radar (+$1,367), and the system integration of Joint Interoperability of Tactical Air Command and Control Systems and Implementation of Advanced Data Communication Control Procedures mode 7 protocal in project C0062 (+$564); the lack of funding in project C1066 reflects a $109 decrease. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary: Tactical Systems Inter/Intraoperability Program: The FY 1983 estimate was reflected as TBD, but has since been determined to be $3,798. Intelligence Analysis Center: FY 1981 increase of 580 is due to developmental test of identified correction requirements in the full scale engineering development

Program Element: 26626M

Title: Marine Corps Command/Control/Communications Systems (Operational Systems)

DoD Mission Area: 351-Land Warfare

Budget Activity: 4 - Tactical Programs

effort; FY 1983 estimate was reflected as TBD, but has since been determined to be $1,964. Marine Air Command and Control System Operational Development: The FY 1981 decrease of 1,914 below the estimate is due to Congressional reprogramming to the higher priority Tactical Air Operations Central-1985 development. The FY 1983 estimate was TBD, but is now determined to be $7,113. Ground Radar Product Improvement: FY 1981 actual decrease of 94 below the estimate occured because field evaluation of the An/TPQ-36 continued. A need for Product Improvement during FY 1981 was not necessary. Aviation Radar Product Improvement: FY 1981 actual decrease of 1,173 below the estimate is due to Congressionally approved reprogramming to the higher priority Tactical Air Operations Central-1985 development. The FY 1983 estimate was TBD, but has since been determined to be $5,572.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,310	10,697	12,202	TBD	Continuing	Continuing
C0045	Tactical Systems Inter/Intraoperability Program	532	1,178	1,777	TBD	Continuing	Continuing
C0062	Intelligence Analysis Center Product Improvement Program	402	1,301	1,400	TBD	Continuing	Continuing
C0103	Marine Air Command and Control System Operational Development	3,485	5,149	4,707	TBD	Continuing	Continuing
C1066	Ground Radar Product Improvement	-	96	109	TBD	Continuing	Continuing
C1067	Aviation Radar Product Improvement	711	2,973	4,209	TBD	Continuing	Continuing

Program Element: 26626M

Title: Marine Corps Command/Control/Communications Systems (Operational Systems)

DoD Mission Area: 351-Land Warfare

Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	Procurement, Marine Corps						
C0103	Marine Air Command/Control Systems Operational Development:						
	Radar Ground Control Bombing System AN/TPD-10	24,318	8,263	-	-		
	(Quantity)	(11)	(3)				
C1067	Aviation Radar Product Improvement						
	Radar Set AN/TPS-59	-	-	-	123,306		
	(Quantity)				(10)		
	Set 15 for AN/TPS-59			6	5		
	(Quantity)			(6)	(5)		
C0062	Intelligence Analysis Center Product Improvement Program		63,990	24,133	14,060	TBD	TBD
	(Quantity)		(4)	(2)	(1)		

Program Element: 26626M

Title: Marine Corps Command/Control/Communications Systems (Operational Systems)

DoD Mission Area: 351-Land Warfare

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Tactical Systems Inter/Intraoperability Program: Supports interoperability for Marine Tactical Command and Control Systems and participation in NATO message standard working groups. Intelligence Analysis Center Product Improvement Program: This project provides funds to correct deficiencies identified during development. Marine Air Command and Control System Operational Development: This project provides funds to correct deficiencies identified during development and ensures that the Marine Air Command and Control System achieves total integration, inter/intraoperability and compatibility within current technology. Ground Radar Product Improvement: This project provides funds for the evaluation of modifications proposed by field units for possible service improvements of existing ground radars. Aviation Radar Product Improvement: This project provides funds to insure that modifications, improvements and actions, in response to field-identified discrepancies are developed for existing aviati. radars and associated equipment.

(U) RELATED ACTIVITIES: This program relates to all tactical command, control and communications systems.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA; Marine Corps Tactical Systems Support Activity, Marine Corps Base, Camp Pendleton, CA; Naval Electronics Systems Command, Washington, DC; Naval Ocean Systems Center, San Diego, CA; U.S. Air Force Tactical Intelligence Systems Directorate, Hanscom Field, Boston, MA: Naval Surface Weapons Center, Dahlgren, VA; Combat Surveillance and Target Acquisition Lab, Ft. Monmouth, NJ. Contractors: Litton Industries, Van Nuys, CA; Westinghouse, Baltimore, MD; Systems Development Corp., McLean, VA; Computer Science Corporation (CSC), San Diego, CA; Sierra Research Corp., Buffalo, NY; General Electric Corp ., Syracuse, NY; Hughes Aircraft Co., Fullerton, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Formal interface testing of the Tactical Air Control System/Tactical Air Defense System was initiated during FY 1973. The West Coast Procedural Exercise and Operational Effectiveness Demonstration have been completed. Validation of the Operational Effectiveness Demonstration interface technical changes has commenced. Participate in NATO message standard working groups on a regular basis. Intelligence Analysis Center: Developmental test/operational test completed. Work was directed toward completing all engineering actions to ready the Intelligence Analysis Center for production. Specifically, work was conducted on modifications for the query response unit, plotter and software used in mapping and message retrieval. Continue system integration. The Marine Air Command and Control System Operational Development program includes several subsystems within its scope of operation. The Improved Tactical Air Operations Center program was initiated during 1973. The Marine Air Command and Control System Training Improvement Program was initiated during 1973. The AN/TPS-63 Radar production phase is complete and a modification program on the AN/TPS-32 Radar has commenced. A decision was made in 1981 to award a production contract to Sierra Research Corp for Fabrication of AN/TPB-1C Radar Ground Controlled Bombing System and to cancel the AN/TPQ-27 Program. The AN/UYQ-4 Direct Air Support Central is in the production phase. A contract with General Electric, Syracuse, NY for AN/TPS Set 15 Development was finalized. Support was provided for operational testing and validation of tactical computer programs to support the Marine Air Command and Control System. Procurement of the AN/TPQ-36 Radar was completed during FY 1980. FY 1981 efforts involved field evaluation of the system for operational deficiencies.

Program Element: 26626M

Title: Marine Corps Command/Control/Communications Systems (Operational Systems)

DoD Mission Area: 351-Land Warfare

Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue Tactical Air Control System/Tactical Air Defense System requalification testing and configuration control. Continue to participate in NATO message standard working groups. Continue hardware design and implementation of the modifications to the Intelligence Analysis Center Query Response Unit, Plotter and the software used in mapping and message retrieval. Conduct verification test of USMC modifications to Air Force basic AN/TPB-1C Radar Controlled Ground Bombing System. Commence work on AN/UYQ-4A Direct Air Support Center to AN/TPB-1D (Radar Controlled Ground Bombing System) burst transmission information exchange capability. Define AN/UYQ-4A Direct Air Support Center interface with Position Location Reporting System. Develop test activity simulation system for capability verification of operational programs. Continue development of Data Link Emulator Test and Training Capability. Initiate evaluation of mission planning system for use in the Tactical Air Command Center and Subordinate Operating Elements. Continue development of TPS-59 and TPS-32 radar decoys. Continue to monitor field operation of the AN/TPQ-36 to identify deficiencies.

3. (U) FY 1983 Planned Program: Continue to provide support for interoperability studies and testing. Continue the emphasis on NATO interoperability. Continue Product Improvement of Intelligence Analysis Center FY 1982 effort. Continue work on Marine Air Command and Control System deployability development and Electronic Counter-Countermeasures capability. Complete development of AN/UYQ-4A Direct Air Support Center to AN/TPQ-1D Radar Controlled Ground Bombing System burst transmission information exchange capability. Ground Radar Product Improvements: Continue field identified discrepancy corrections.

4. (U) FY 1984 Planned Program: Continue to provide support for Marine Tactical Command and Control System interoperability. Continue emphasis on NATO interoperability. Maintenance of Software configuration management and investigation of problem report corrections will be ongoing. Continue support for Marine Air Command and Control System software, Electronic Counter-Countermeasures and deployability developments. Continue Marine Air Command and Control System/Forward Area Air Defense data exchange effort. Continue camouflage development effort for Marine Air Command and Control System equipment. Continue developing Anti-Anti-Radiation Missile Technology for Integrated Marine Air Command and Control Systems radars. Commence efforts to interface Position Location Reporting System into the AN/UYQ-4A Direct Air Support Center. Ground Radar Product Improvements: Continue to develop modifications in response to field identified deficiencies of the AN/TPQ-36.

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

6. (U) Milestones:

	MSARC II	MSARC III	IOC
Intelligence Analysis Center	Apr 75	Apr 81	1984

Project: C0103 Title: Marine Air Command and Control System Operational Development
Program Element: 26626M Title: Marine Corps Command/Control/Communications Systems (Operational Systems)
DoD Mission Area: 351-Land Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides support for the operational systems of the Marine Air Command and Control System and ensures that the automated equipment for the Marine Air Command and Control System achieves interoperability and compatibility within the Marine Corps and in Joint/Allied Operations.

(U) RELATED ACTIVITIES: This project relates to all other Marine Corps Tactical Command and Control System projects.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA; Naval Electronics System Command, Washington, DC; Marine Corps Tactical Systems Support Activity, Marine Corps Base, Camp Pendleton, CA. Contractors: UNIVAC, St. Paul, MN; Litton Industries, Van Nuys, CA; Westinghouse, Baltimore, MD; Rockwell International, Richardson, TX; GTE Sylvania, Needham Heights, MA, Sierra Research Corporation, Buffalo, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Modification to Marine Air Command and Control System equipment to ensure interoperability is a continuing effort. The Improved Tactical Air Operations Center Development Program has been completed. The Training Improvement Program has been completed. Integration test on modification kits for the 15A19 Trainer has been conducted. Work has commenced on deployability development and Electronic Counter Countermeasures development. Commenced work on software development for NATO interoperability. Completed Digital Communication Terminal interface for the AN/UYQ-4A DASC. Completed the AN/UYQ-4A Training Application Program.

2. (U) FY 1982 Program: Continue efforts to develop Tactical Air Command Center Modification upgrade and system life extension. Develop modifications required for the AN/UYQ-4 and AN/TPB-1D Radar Ground Control Bombing System as a result of follow-on testing. Complete NATO interoperability modes. The major operational systems supported by the Marine Air Command and Control System are the Tactical Air Command Center, the Direct Air Support Center, the Air Support Radar Teams and the Tactical Air Operations Center. The FY 1982 funding provides for cost growth in the Tactical Air Command Center modification upgrade and system life extension; and the need for development of modifications required by the Marine Corps to the USAF TPB-1C Radar Ground Controlled Bombing System which the Marine Corps will field during FY 1983 in lieu of the AN/TPQ-27. Commence work on data burst transmission information exchange capability between the AN/TPB-1D and the AN/UYQ-4A. Define the AN/UYQ-4A interface with the Position Location Reporting System.

3. (U) FY 1983 Planned Program: Complete work on burst transmission information exchange capability between AN/UYQ-4A Direct Air Support Center and AN/TPB-1D.

4. (U) FY 1984 Planned Program: Continue Tactical Air Command Center development to achieve Tactical Air Operations Central - 1985 interoperability. Maintain Engineering Change Proposal development for the Marine Air Command and Control System systems. Maintain systems support as required.

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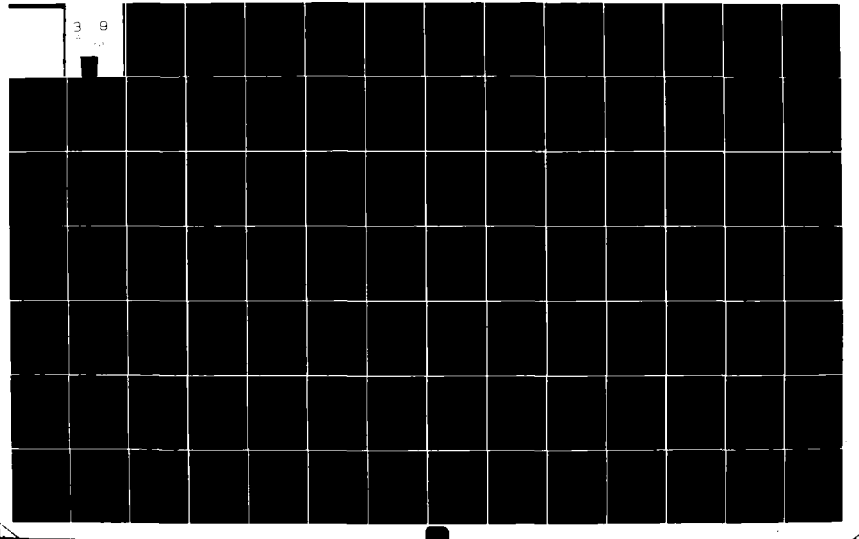

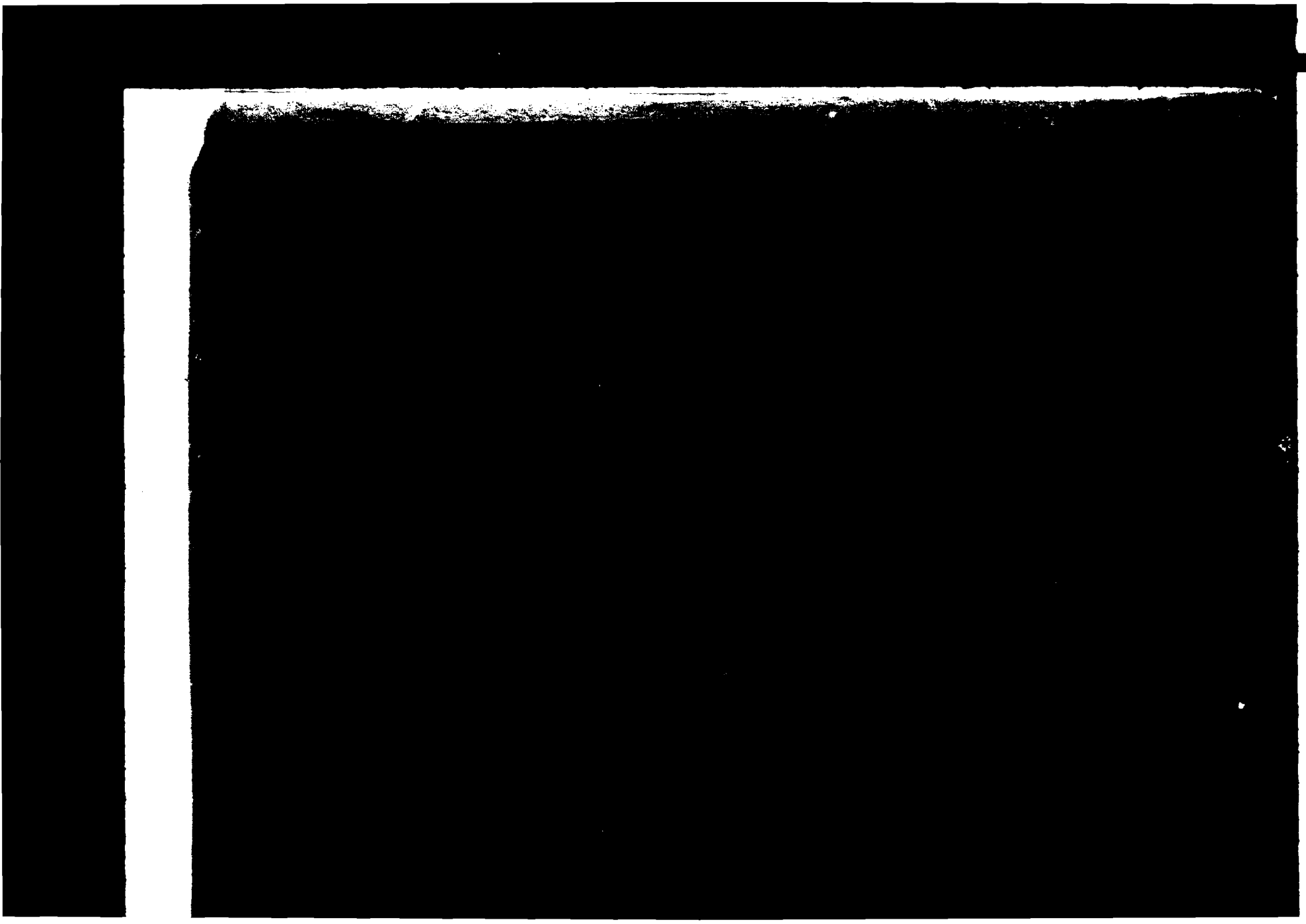

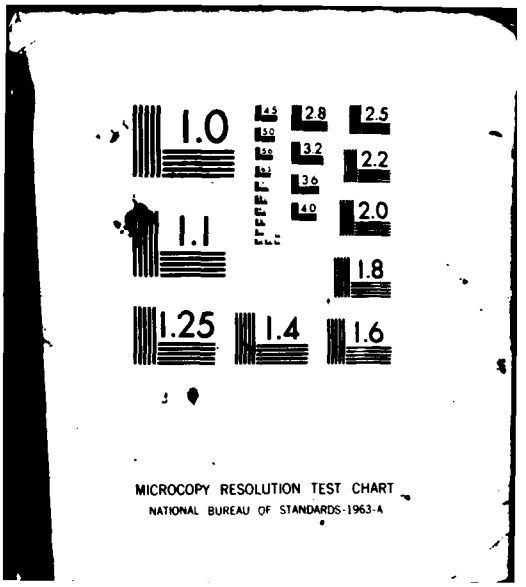
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Project: C0103 Title: Marine Air Command and Control System Operational Development
Program Element: 26626M Title: Marine Corps Command/Control/Communications Systems (Operational Systems)
DoD Mission Area: 351-Land Warfare Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: N/A.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Etimate	Additional to Completion	Total Estimated Cost
C0103	Marine Air Command and Control System Operational Development	3,235	4,703	7,113	7,859	Continuing	Continuing

Project: C1067 | Title: Aviation Radar Product Improvement
Program Element: 26626M | Title: Marine Corps Command/Control/Communications Systems (Operational Systems)
DoD Mission Area: 351-Land Warfare | Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: A requirement exists to insure that modifications, improvements and action in response to field identified discrepancies are developed for existing aviation radars and associated equipments. Additionally, there is a requirement to develop Electronic Counter-Countermeasures (ECCM) Anti-AntiRadiation Missile (Anti-ARM) capability for existing radar systems.

(U) RELATED ACTIVITIES: This program relates to all Tactical Command, Control and Communications Systems.

(U) WORK PERFORMED BY: In-House: Marine Corps Development and Education Command, Quantico, VA; Marine Corps Tactical Systems Support Activity, Camp Pendleton, CA; Naval Electronics System Command, Washington, DC; Naval Weapons Center China Lake, CA; Contractor: General Electric, Syracuse, NY; ITT Gilfillan, Van Nuys, CA; Aydin Microwave Division, San Jose, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Modifications incorporated into the AN/TPS-32 Radar under this program include the Steel Bellows Air Compressor, the Transmitter Control Unit Modification Kit, and the Mode IV Identification Friend or Foe Modification Kit. Initiated HAT-100 system specifications for the AN/TPS-32. Initiated Set 15 development for the AN/TPS-59.

2. (U) FY 1982 Program: Develop and test Anti-Anti Radiation Missile capability for all Marine Corps aviation radars. Develop centralized control compatability for aviation radars with the Tactical Air Operations Central - 1985, which will be fielded in 1985. Continue efforts on AN/TPS-32 to improve random access memory capability. Incorporate an adaptive video processor (clutter mapper) and an open loop adaptive moving target indicator into the AN/TPS-32 to improve reliability and availability.

3. (U) FY 1983 Planned Program: Evaluate the AN/UPX-27 Identification Friend or Foe Solid State Transmitter. Continue Electronic Counter Counter Measures and Anti-Anti Radiation Missile efforts and centralized emissions control for radars. Design and test modifications to radar system required by field report discrepancies.

Project: C1067 Title: Aviation Radar Product Improvement
Program Element: 26626M Title: Marine Corps Command/Control/Communications Systems (Operational Systems)
DoD Mission Area: 351-Land Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Program will be a continuing effort to provide required changes/modifications to production and fielded equipment. Emphasis will be placed on changes to the AN-TPS-59 and the AN-TPS-32. Additionally, work will continue on the radar remoting effort and Anti-Anti Radiation Missile Countermeasures.

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

6. (U) Milestones:

Milestone	Date
AN/TPS-59 Radar	
1. Milestone I	1971
2. Milestone II	1972
3. Milestone III	1978
4. Initial Operational Capability	1985

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Etimate	Additional to Completion	Total Estimated Cost
C1067	Aviation Radar Product Improvement AN/TPS-59	1,800	4,205	5,572	6,803	Continuing	Continiuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 26627M
Title: Marine Corps Technical Support of Command and Control Systems
DoD Mission Area: 212-Indirect Fire Support
Budget Activity: 4 - Tactical Programs

RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	-*	2,600*	2,798	2,959	Continuing	Continuing
C1664	Marine Corps Technical Support of Command and Control	-*	2,600*	2,798	2,959	Continuing	Continuing

* This project was initiated in FY 1982 by below threshold reprogramming action in Program Element 65854M, Development Center Support. This is a new Program Element established in FY 1983 to more accurately reflect fund usage.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: During July 1970, the Marine Corps Tactical Systems Support Activity (MCTSSA) was formed to meet the increasing demands of the Marine Corps for developing and supporting automated tactical systems. It has been determined that the Marine Corps objectives relating to compatibility and interoperability of tactical data systems, as well as the attainment of standardization of systems hardware and software, could best be achieved through a centralization of both the testing and support of tactical data systems at one activity. This activity provides software management control and program support for fielded tactical data systems and those tactical data systems assigned to Marine Corps Tactical System Support Activity for developmental test and evaluation. A highly flexible network of developmental programming, simulation, and testing has existed for support of Marine Corps Tactical Systems at this facility, however, current activities also include software product improvement for both existing and yet to be fielded command and control systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Joint tactical data system testing will continue. Funds will be used to support primarily Marine Air Command and Control System equipment used in this testing. Two additional systems will be fielded during FY 1983 and will require software support by this activity. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: N/A This is a new project.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not Applicable.

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 26627M
DoD Mission Area: 212-Indirect Fire Support

Title: Marine Corps Technical Support of Command and Control Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Marine Corps Tactical Systems Support Activity supports the mission of the Development Center within the Marine Corps Development and Education Command by performing developmental testing and evaluation during the required milestones in the acquisition cycle for tactical data systems being developed. In addition, this organization assists Fleet Marine Force units in conducting Operational Test and Evaluation of tactical data systems and telecommunications equipment. Software programs for the following Marine Air Command and Control Systems will be certified annually: Tactical Air Command Center, Tactical Air Operations Center, and Direct Air Support Center. In addition, efforts will continue with monitoring the software development of Marine Tactical Command and Control Systems: Marine Air Ground Intelligence System, Marine Integrated Fire and Air Support System, Tactical Air Operation Central-1985.

(U) RELATED ACTIVITIES: Software programs of currently fielded tactical systems will be certified in accordance with Joint Interoperability of Tactical Command and Control Systems and Tactical Air Control System/Tactical Air Defense System procedures. Software trouble reports will continue to be generated as a result of this testing and will require resolution.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA.; Marine Corps Tactical Systems Support Activity, Camp Pendleton, CA. Contractors: Systems Development Corporation, San Diego, CA.; Digital Equipment Corporation, San Diego, CA; Litton Data Systems Division, Van Nuys, CA., ITT Gilfillan, Van Nuys, CA.; Sperry Univac, Defense Systems Division, St. Paul, MN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: N/A

2. (U) FY 1982 Program: Provide support for transition testing of Joint Interoperability of Tactical Command And Control Systems and Tactical Air Control Systems/Tactical Air Defense Systems. Develop a compile facility for Interactive C programming support. Continue support for fielded tactical systems.

3. (U) FY 1983 Planned Program: Upgrade the simulation capability to ensure currency with joint interfaces for the purpose of supporting developmental testing. Continue certification testing and support of tactical systems. Development software capability for the Direct Air Support Center (AN/UYQ-4A).

Program Element: 26627M
DoD Mission Area: 212-Indirect Fire Support

Title: Marine Corps Technical Support of Command and Control Systems
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Upgrade software support capability in preparation for supporting two major tactical data systems scheduled for introduction into the Fleet Marine Force during FY 1985.

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

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 28009N
DoD Mission Area: 242 - Theater-Wide Nuclear Warfare

Title: Cruise Missile
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	18,010	24,305	Continuing	Continuing
X1661	TOMAHAWK Improvement Program (Sub-Tasks, Quantities)	0	0	18,010	24,305	Continuing	Continuing (*)

*Sub-Tasks and Test-Item Quantities are too numerous to tabulate.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The TOMAHAWK Improvement Program will develop follow-on improvements for which concepts are identified in the baseline Sea Launched Cruise Missile Full Scale Engineering Development. These improvements will be developed as preplanned product improvements. The baseline program is funded under Program Element 64367N, TOMAHAWK.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue the [redacted] development efforts initiated in Program Element 64367N, TOMAHAWK. Initiate Full Scale Engineering Development of anti-ship guidance changes (Block II Improvements including [redacted]). Initiate range improvement for the conventional land attack variant and commence development of a [redacted] for conventionally armed variants. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). Not applicable.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not applicable. New Start in FY 1983.

(U) OTHER APPROPRIATIONS FUNDS: Procurement costs for block changes developed in this program element are contained in the Weapons Procurement, Navy, funding shown in the Descriptive Summary for Program Element 64367N.

Program Element: 28009N Title: Cruise Missile
DoD Mission Are: 242 - Theater Wide Nuclear Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The TOMAHAWK Weapons System is a long range cruise missile system (land attack and anti-ship) sized to fit submarine torpedo tubes and capable of deployment from submarines and surface ships. Three baseline variants are scheduled to complete full scale engineering development in submarines and surface ships between FY 1982 and FY 1984. Follow-on improvements for which concepts were identified in the baseline TOMAHAWK Full Scale Engineering Development (Program Element 64367N) will be developed as preplanned product improvements. Anti-ship guidance changes funded in this program element are additionally applicable to the HARPOON anti-ship cruise missile which was service approved in FY 1977, and is being procured for U.S. and allied inventories.

(U) RELATED ACTIVITIES: The baseline TOMAHAWK weapon system development effort is funded under Program Element 64367N. This program will complete a conventional land attack development in FY 1982 and a submarine launch booster improvement in FY 1984. The HARPOON anti-ship cruise missile development was completed in Program Element 64364N (last funded in FY 1976).

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Point Mugu, CA; Naval Underwater Systems Center, Newport, RI; Naval Weapons Center, China Lake, CA. Contractors: General Dynamics/Convair, San Diego, CA; McDonnel Douglas Astronautics Corp., St. Louis, MO; Williams Research Corporation, Walled Lake, MI; Vitro Laboratories, Silver Spring, MD; Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; Lincoln Laboratories, Massachusetts Institute of Technology, Lexington, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Not applicable. This program is a planned FY 1983 new start.

2. (U) FY 1982 Program: This program is a planned FY 1983 new start. Under Program Element 64367N (TOMAHAWK) conventional land attack Design efforts will be initiated, and an capability development will be completed. (Program Element 64367N includes a booster improvement effort for all variants which will not transfer to this element.)

3. (U) FY 1983 Planned Program: Continue full scale development of terminal maneuver and Multipurpose Submunition Dispenser for the conventional land attack variant. Initiate Full Scale Engineering Development of anti-ship guidance changes (Block II improvements including for TOMAHAWK and HARPOON. Initiate range extension effort for the conventional land-attack variant and a capability for both conventionally armed variants (booster improvement continues in Program Element 64367N).

4. (U) FY 1984 Planned Program: Complete development of the conventional land attack Continue all other efforts in progress in FY 1983. (The TOMAHAWK booster improvement effort will be completed in Program Element 64367N.)

Program Element: 28009N
Title: Cruise Missile
DoD Mission Are: 242 - Theater Wide Nuclear Warfare
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: This is a continuing program. Five additional improvements are scheduled to commence development in FY's 1985 and 1986. Other initiatives will be added as required.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 28010M

Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9,193	16,343	15,543	11,297	Continuing	Continuing
C0049	Unit Level Circuit Switch	5,273	13,177	8,456	4,940	Continuing	Continuing
C0055	Unit Level Message Switch	3,270	2,203	5,483	4,861	Continuing	Continuing
C0056	TRITAC Joint Testing Facility	559	823	1,453	1,204	Continuing	Continuing
C0065	Marine Corps Particiation in TRITAC Programs	91	140	151	292	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides for the development of the unit level switches for which Marine Corps has been designated the developing service by Assistant Secretary of Defense for Command, Control, Communications and Intelligence and further provides Marine Corps support to the Joint Testing Office as well as Marine Corps testing of Joint Tactical Communications Program equipments. Equipments developed within this program support the mission area of command and control and specifically support the switching requirements of the various subsystems within the Marine Tactical Command and Control Systems concept.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To continue full-scale development and testing of the Unit Level Circuit Switch in addition to the full-scale development of the Unit Level Message Switch. The Activities of the Joint Testing Office will be supported. Work on test plans for Marine Corps unique requirements will also continue. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Unit Level Circuit Switch: FY 1981 increase of 1979 is due to low estimates of software development costs; FY 1982 decrease of 1,000 was made by the Congress. 213 was reduced as a result of inflation/escalation charges. FY 1983 increase above previous estimate of 2,958 is to incorporate TRITAC approved changes in the ULCS that cannot be implemented due to the baseline being frozen until Full Scale Development is completed; Unit Level Message Switch: FY 1983 increase of 3962 is to incorporate interface changes that will be required to support the Marine Corps Tactical Command and Control Systems. TRITAC Joint Testing Facility: The FY 1981 decrease of 90 is due to minor program realignment in the Marine Corps fare share of cost incurred. FY 1983 increase of 392 above the previous estimate is due to increased Marine Corps fair share of cost to support the TRITAC Joint Test Facility.

Program Element: 28010M

Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	13,868	7,374	17,599	8,235	Continuing	Continuing
C0049	Unit Level Circuit Switch	11,755	3,294	14,390	5,498	4,625	65,552
C0055	Unit Level Message Switch	1,495	3,272	2,234	1,521	4,437	16,111
C0056	TRITAC Joint Testing Facility	504	649	834	1,061	Continuing	Continuing
C0065	Marine Corps Unique Testing of TRITAC Equipment	114	159	141	155	Continuing	Continuing

(U) OTHER APPROPRIATIONS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Procurement, Marine Corps						
Unit Level Circuit Switch						
SB3865	-	-	-	13,037	56,731	TBD
(Quantity)	-	-	-	80	(307)	
TTC-42	-	-	-	8,937	16,850	TBD
(Quantity)	-	-	-	(14)	(23)	
Unit Level Mess[illegible] Switch						
AN/GYC-7	-	-	-	-	39,228	TBD
(Quantity)	-	-	-	-	TBD	TBD

Program Element: 28010M

Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Unit Level Circuit Switch/Unit Level Message Switch: To implement Joint Tactical Communications Office sponsored tasks designated for execution by the Marine Corps, i.e., to develop a family of Unit Level Switch boards, which will consist of circuit and message switches. The two subsystems will be able to operate independently or complement each other. Joint Tactical Communications Office Joint Testing: This provides the Marine Corps share of support for testing of Joint Tactical Communications office equipment. Marine Corps Participation in TRITAC Programs: This provides for technical support in the formulation of joint test plans, training, and transportation of Marines and equipment to the joint test bed and administrative/clerical support.

(U) RELATED ACTIVITIES: This effort is related to PE 28010A, Tri-Service Joint Tactical Communications Program, Army; PE 28010F, Tri-Service Joint Tactical Communications Program, Air Force; and PE 28010N, Tri-Service Joint Tactical Communications Program, Navy. National Security Agency is developing Communications Security equipment for the Unit Level Circuit Switch and Unit Level Message Switch programs.

(U) WORK PERFORMED BY: In-house: Naval Ocean System Center, San Diego, CA. Contractors: Calculon Associates Incorporated, Arlington, VA; International Telephone and Telegraph, Nutley, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Requirements and development specifications for the Unit Level Circuit Switch and Unit Level Message Switch have been developed, staffed among all services and approved by TRITAC. Full Scale Development contracts have been initiated for both the Unit Level Circuit Switch and Unit Level Message Switch. Both hardware and software development has progressed in each program. Unit Level Circuit Switch test plans were completed. USMC participation in developmental and operational testing of TRITAC equipment began.

2. (U) FY 1982 Program: Full Scale Engineering Development work will continue in both hardware and software for the Unit Level Circuit Switch. The development contractor will integrate Unit Level Circuit Switch hardware and software and conduct contractor testing. Full-scale development of the Unit Level Message Switch will continue. USMC will participate in developmental and operational testing of Joint Tactical Communications Equipment.

3. (U) FY 1983 Planned Program: Full-scale development of the Unit Level Message Switch will continue. USMC participation in developmental and operational testing of Joint Tactical Communications Office equipment will continue. Full scale development of the Unit Level Circuit Switch will be completed. Operational and Developmental Testing II of the Unit Level Circuit Switch will begin at the Joint Testing Facility, Ft. Huachuca, AZ.

Program Element: 28010M

Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Operational and Developmental Testing II of the Unit Level Circuit Switch will be completed at the Joint Testing Facility, Fort Huachuca, AZ, and Milestone III (Approval for Service Use) will be conducted. Unit Level Message Switch full-scale engineering development will be completed. The Marine Corps will continue to support development/ operational testing at Ft. Huachuca, AZ.

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

6. (U) Milestones:

	I	II	III	IOC
Unit Level Circuit Switch	N/A	Jun 76	Mar 84	FY 86
Unit Level Message Switch	N/A	Sep 78	Apr 85	FY 87

Project: C0049
Program Element: 28010M

Title: Unit Level Circuit Switch
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTIONS: The Marine Corps was tasked by Assistant Secretary of Defense, Command, Control, Communications and Intelligence, to develop and procure a Unit Level Circuit Switch (ULCS) to satisfy all service requirements. This development and acquisition program was further defined in instructions issued to the Marine Corps by the Director, TRITAC. The Unit Level Circuit Switch will extend, where required, the performance capabilities of the new large capacity switches, AN/TTC-39, and its associated Communications Security (COMSEC), to the unit level.

(U) RELATED ACTIVITIES: This effort is related to the Army PE 28010A, TRITAC, Army. The Army is the executive agent for the development of the AN/TTC-39 switch central. The AN/TTC-39 and the Unit Level Circuit Switch can operate together, but will be found at different levels of command. National Security Agency (NSA), is developing Communications Security that will function with the Unit Level Circuit Switch.

(U) WORK PERFORMED BY: In-house: Naval Ocean Systems Center, San Diego, CA. Contractors: Calculon Associated Incorporated, Arlington, VA; International Telephone and Telegraph (ITT), Nutley, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Technology studies have been completed. Unit Level Circuit Switch specifications were approved by the military services and applicable DoD agencies. A Principal Development Activity was designated and Marine Corps Systems Acquisition Review Council (MSARC) Milestone II Review has been accomplished. Full-Scale Engineering Development (FSED) contract was awarded to ITT, and test plans were completed.

2. (U) FY 1982 Program: Full-Scale Engineering Development will continue. The development contractor will integrate hardware and software and conduct contractor testing.

3. (U) FY 1983 Planned Program: Full-Scale Engineering Development will be completed. Development and Operational Testing III at the Joint Testing Facility, Fort Huachuca, AZ, will commence.

4. (U) FY 1984 Planned Program: Developmental and Operational Testing III at the Joint Testing Facility, Fort Huachuca, AZ, will be completed and MILESTONE III (Approval for Service Use) will be achieved.

5. (U) Program to Completion: The Marine Corps Systems Acquisition Review Council III is scheduled for 1984 with Initial Operational Capability (IOC) of FY 1986. Numerous follow-on R&D efforts are being discussed currently in the joint community to further enhance the capabilities of the new switches.

Project: C0049
Program Element: 28010M

Title: Unit Level Circuit Switch
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	I	II	III	IOC
Unit Level Circuit Switch	N/A	Jun 76	Mar 84	FY 86

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0049	Unit Level Circuit Switch	5,273	13,177	8,456	4,940	Continuing	Continuing

Project: C0055 — Title: Unit Level Message Switch
Program Element: 28010M — Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps
DoD Mission Area: 345-Tactical Communications — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Marine Corps was tasked by Assistant Secretary of Defense, Command, Control, Communications and Intelligence, to develop and procure a Unit Level Message Switch (ULMS) to satisfy all service requirements.

(U) RELATED ACTIVITIES: This effort is related to the Army PE 28010A. The Army is the executive agent for development of the AN/TYC-11 message switch. The AN/TYC-11 and Unit Level Message Switch (AN/GYC-7) will be able to operate together, but will be found at different levels of command. National Security Agency (NSA) is developing Communications Security that will function with the Unit Level Message Switch.

(U) WORK PERFORMED BY: In-house: Naval Ocean Systems Center, San Diego, CA. Contractors: Calculon Associates Incorporated, Arlington, VA; International Telephone and Telegraph (ITT), Nutley, NJ.

1. (U) FY 1981 and Prior Accomplishments: Technology studies were completed. Unit Level Message Switch specifications were approved by the military services and applicable DoD agencies. A Principal Development Activity was designated and Marine Corps Systems Acquisition Review Council (MSARC) MILESTONE II Review was accomplished. Full-Scale Engineering Development (FSED) contract was awarded to ITT, and test plans were completed.

2. (U) FY 1982 Program: Full-Scale Engineering Development will continue with the Contractor.

3. (U) FY 1983 Planned Program: Full-Scale Engineering Development will continue with the Contractor.

4. (U) FY 1984 Planned Program: Developmental and Operational Testing II at the Joint Testing Facility, Fort Huachuca, AZ, will be completed and MILESTONE III (Approval for Service Use) will be achieved.

5. (U) Program to Completion: The Marine Corps System Acquisition Review Council III is scheduled for 1985 with Initial Operational Capability (IOC) of 1987.

6. (U) Milestones:

	Date
a. Development Test/Operational Test II start	1984
b. Development Test/Operational Test II completed	1984
c. Marine Corps Systems Acquisition Review Council III	1985
d. Initial Operational Capability	1987

Project: C0055
Program Element: 28010M

Title: Unit Level Message Switch
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Marine Corps

DoD Mission Area: 345-Tactical Communications

Budget Activity: 4 - Tactical Programs

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0055	Unit Level Message Switch	3,270	2,203	5,483	4,861	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 28010N
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Navy
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	13,533	9,208	9,374	9,114	Continuing	Continuing
X0700	Naval Telecommunications System Test Node	1,074	1,121	1,329	1,380	Continuing	Continuing
X0722	Tactical Digital Facsimile	4,478	100	97	0	0	22,060
X0723	Joint Service Testing	174	210	195	207	Continuing	Continuing
X0919	Advanced Narrowband Digital Voice Terminal	7,807	7,777	7,753	7,527	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This continuing program includes four projects which directly support the Department of Defense multi-service/agency Joint Tactical Communications Program (TRITAC). Projects include engineering efforts to participate in and support TRITAC system endeavors including the joint test program for TRITAC and Navy equipment/systems for interoperability assurance. It also provides for improved secure voice communications to be implemented by the TRITAC program in tactical and Defense Communications Systems, and for advanced digital facsimile equipment to provide graphics and record transmissions to tactical forces.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete development efforts and initiate procurement of the Tactical Digital Facsimile. The Advanced Narrowband Digital Voice Terminal development contractor will continue fabrication, assembly, and test of the Tactical Terminal (CV-3591) Full Scale Engineering Development Models. The advanced development of the Miniaturized Terminal will begin with selection of a single contractor on a competitive basis. Continuation of systems interoperability testing of the TRITAC baseline and Navy systems as a result of joint test plans for TRITAC equipment will be accompanied by provision of the Navy 5% share of funding to the TRITAC Joint Test Facility, Ft. Huachuca, AZ, and the Naval Telecommunications System Test Node, Naval Ocean Systems Center, San Diego, CA. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are: (a) Tactical Digital Facsimile (project X0722) funding was increased in FY 1983 by $97 to support development models at Joint Test Facility prior to productions model availability. (b) Advanced Narrowband Digital Voice Terminal, Project X0919, funding estimate for FY 1983 was increased by $1,708 to reflect increased cost anticipated for completion of R&D of militarized Tactical Terminal and initiation of the Miniaturized Terminal development. In FY 1983 a decrease of $196 in Naval Telecommunications System Test Node and $34 in Joint Service Testing was a

result of program schedule adjustments. Decrease of $167 in FY 1981 and $1,668 in FY 1982 is due to inflation adjustment for all projects and a $1,000 Congressional reduction in FY 1982 funds for the Advanced Narrowband Digital Voice Terminal.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	10,259	13,700	10,876	7,799	Continuing	Continuing
X0700	Naval Telecommunications System Test Node	1,057	1,310	1,409	1,525	Continuing	Continuing
X0722	Tactical Digital Facsimile	4,838	4,524	100	0	0	22,286
X0723	Joint Service Testing	218	208	212	229	Continuing	Continuing
X0919	Advanced Narrowband Digital Voice Terminal	4,146	7,658	9,155	6,045	18,122	51,934

(U) *OTHER APPROPRIATIONS FUNDS:*

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN						
Tactical Digital Facsimile (Quantity) 1/	0	0	5,151	10,200	9,100	24,451
Advanced Narrowband Digital Voice Terminal (Quantity) 2/	0	0	0	0	48,300	48,300
Joint Tactical Communications 333312	0	0	6,985	5,154	52,518	64,657

Note 1: Refined initial inventory objective of 245 Digital Facsimile Terminals (88 having meteorological interface units) with delivery commencing in FY 1984 through FY 1986.

Note 2: Refined initial inventory objective of 3,000 Digital Voice Terminals with delivery commencing in FY 1988 through 1990. Long range inventory objective is 6,404 terminals. Current unit cost estimate of $16.1 thousand per terminal (excluding COMSEC Module).

'rogram Element: 28010N
)oD Mission Area: 345 - Tactical Communications

Title: Tri-Service Joint Tactical Communications Program (TRITAC), Navy
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program includes four projects which support efforts related to the TRITAC program as directed by the Office of the Secretary of Defense. The advanced development projects include full scale development of the Tactical Digital Facsimile and the Advanced Narrowband Digital Voice Terminal as assigned by Department of Defense under the TRITAC programs. Other projects provide for Navy management and engineering support to and participation in the systems analysis activities of the TRITAC program with emphasis on the land-based/sea-based systems interoperability, including management and implementation of the Naval Telecommunications System Test Node and the Joint Test Facility.

(U) RELATED ACTIVITIES: The projects within this element are complementary to other Navy communications improvement efforts: PE 24163N, Fleet Telecommunications (Tactical); PE 33109N, Satellite Communications; and PE 33126N, Long Haul Communications and to the overall TRITAC effort, PE 28010.

(U) WORK PERFORMED BY: In House: Naval Electronic Systems Command, Washington, DC; Naval Electronic Systems Security Engineering Center, Washington, DC; Naval Ocean Systems Center, San Diego, CA (lead laboratory); Joint Test Organization, Ft. Huachuca, AZ; Naval Electronic Systems Engineering Center, Charleston, SC; and Naval Research Laboratory, Washington, DC. Contractors: Datalog Division, Litton Systems, Inc., Melville, NY; International Telephone and Telegraph Corporation (Defense Communications Division) Nutley, NJ; Ketron, Wayne, PA; CNR, Incorporated, Newton, MA; Vought Corporation, Dallas, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed program plan and master plan for TRITAC/Naval Telecommunications Test Node to support DoD defined Navy interoperability tests for the AN/TTC-39 Switch and the AN/TSQ-111 Nodal Control Element to support Joint Test Plans for TRITAC program acquisitions. Provided management and engineering support to the TRITAC program efforts with analysis emphasis on interoperability between the TRITAC and Naval Telecommunications System. Completed implementation of the Naval Telecommunications System Test Node with TRITAC Joint Test Facility, Ft. Huachuca, AZ. Participated in joint Development Test and Evaluation and Initial Test and Evaluation of the communications security system TENLEY, the AN/TTC-39 and AN/TTC-39. Continued direct support to the TRITAC Joint Test Organization, provided Navy personnel for joint training courses on several acquisition programs to prepare for Joint Development Test and Evaluation and Initial Operational Test and Evaluation of the TRITAC acquisitions. Provided annual Navy share of funding support to the Joint Test Organization, Ft. Huachuca, AZ. Continued full scale engineering development of the Tactical Digital Facsimile. Completed joint service preparation and review of Tactical Digital Facsimile Development Test and Evaluation. Initial Operational Test and Evaluation plans and initial Integrated Logistics Support planning accomplished. First phase of government test of Tactical Digital Facsimile completed in July 1981. Under tasking from DoD, and in consideration of application technology efforts performed in PE 33401N, Communications Security, in FY 1976, FY 19TQ, and FY 1977, the Advanced Narrowband Digital Voice Terminal effort was initiated in coordination with the National Security Agency, TRITAC, joint services and Defense Communications Agency. Feasibility model solicitation efforts culminated with the release of the Request for Proposals. Subsequent review and joint service evaluation of proposals resulted in preparation of

and subsequent award of two competitive validation phase contracts. The competing validation contractors, International Telephone and Telegraph and Texas Instruments, completed the hardware and software feasibility design of the military tactical terminal design of the Advanced Narrowband Digital Voice Terminal. Full Scale Development initiated with ITT, Nutley, NJ.

2. (U) FY 1982 Program: The continuation of Navy participation in the TRITAC program effort will have led to Defense System Acquisition Review Council actions on TRITAC programs. The engineering analysis of the Naval Telecommunications System/TRITAC interoperability aspects will produce definitive guidance to the shore interface for the gateway requirement. Navy participation in all management and engineering efforts will continue as will Navy share of funding to the Joint Test Facility as directed by Office of the Secretary of Defense. The Tactical Digital Facsimile will be approved for service use and the procurement contracts for the Tactical Digital Facsimile will be readied for award. Production Acceptance and Follow-on Test and Evaluation plan will be completed. The Advanced Narrowband Digital Voice Terminal, CV-3591, contractor will continue engineering development models. The Miniaturized Terminal development will be initiated with validation phase predevelopment effort.

3. (U) FY 1983 Planned Program: The previously tested major equipment of the TRITAC program will constitute the systems baseline for initiation of the systems level test of the program centered on the Unit Level Circuit Switch Development Test and Evaluation and Initial Operational Test and Evaluation. Major switching, control, transmission and access program interoperability testing will be conducted utilizing the facilities of the Naval Telecommunications System Test Node as a major element of the Joint Test Facility. Management and engineering support will produce individual equipment analysis for determination of Navy procurement planning. The Operational Test and Evaluation being conducted by the Navy will emphasize system level testing of the Unit Level Switch. The Tactical Digital Facsimile will be in the initial production phase with Follow-on Operational Test and Evaluation being conducted by Navy to investigate additional Command, Control and Communications applications to be supported by Tactical Digital Facsimile use. The Air Force will complete operational tests of application of the Tactical Digital Facsimile, (in Europe) to the Intratheater Imagery Transmission System program. The Advanced Narrowband Digital Voice Terminal CV-3591 will be undergoing joint Development Test and Evaluation and Initial Operational Test and Evaluation together with engineering models of the National Security Agency developed KYV-5 crypto modules. Development requirements will essentially be satisfied for FY 1983; however, the Miniaturized Terminal will continue advanced development.

4. (U) FY 1984 Planned Program: Major system and equipment interoperablity testing will continue between the Naval Telecommunication System Test Node and the Joint Test Facility at Fort Huachuca, AZ. Support to Joint Service Testing will continue, as directed by DoD, with Navy provision of 5 percent of the total funding. The Tactical Digital Facsimile will be in the production phase with plans approved for Production Acceptance Test and Evaluation and Follow-on Operational Test by the joint services. Development Test and Evaluation and Initial Operational Test and Evaluation of the Advanced Narrowband Digital Voice Terminal will be completed, the Joint Production Review accomplished, Approval for Service Use obtained, and Production Request for Proposal issued. Advanced development of the Miniaturized Terminal will continue for the joint services.

Program Element: 28010N
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Navy
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: This is a continuing program. Full Navy Participation in the TRITAC management, engineering, and test and evaluation process will continue as required by Office of the Secretary of Defense directed efforts. The Tactical Digital Facsimile development will be completed and production ongoing; however, the engineering development models assigned to the Facility Support Element at the Joint Test Facility, Ft. Huachuca, will continue to be supported until production models are available to replace them. The remaining items of TRITAC program equipment will be involved in the Development Test and Evaluation and Initial Operational Test and Evaluation program for the next several years. The possibility exists for the Joint Test Facility to form the nucleus of a facility for configuration management of the hardware and software configuration control during the post deployment phase of the TRITAC program. The Advanced Narrowband Digital Voice Terminal, CV-3591, is expected to begin initial production in FY 1985.

6. (U) Milestones: Not applicable.

Project: X0919
Program Element: 28010N
DoD Mission Area: 345 - Tactical Communications

Title: Advanced Narrowband Digital Voice Terminal
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Navy
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Voice communications by means of high frequency radio have long been the mode of communications most susceptible to enemy exploitation and the most difficult to secure. The long distances over which these frequencies propagate make enemy intercept a simple task. The approach to securing these communications requires a complex conversion of the voice signal to a digital format that is readily encryptable. This analog to digital conversion and its inverse, performed at data rates low enough for use with narrowband high frequency communications, have been under development for several years. Recent advances in speech processing techniques, along with the availability of advanced large-scale integration circuitry, now provide an opportunity to develop a narrowband digital secure voice system that meets operational, physical, and cost requirements. This development will provide for long-term communications security and, for the first time, the military services and defense agencies will be able to implement the national policy regarding the security of high frequency, narrowband systems. The initial operational capability is required by 1987 and applications will include numerous tactical and strategic nets. There are two general terminal configurations within the system. The first is a modularized military Tactical Terminal consisting of a voice and modem processor (CV-3591) and a plug-in communications security module, KYV-5. The second is a Miniaturized Terminal to be used in a transportable manpack configuration suitable for integration in associated tactical communications systems. The Miniaturized Terminal will begin development in FY 1982.

(U) RELATED ACTIVITIES: Initial efforts conducted within the Advanced Narrowband Digital Voice Terminal program were performed in Program Element 33401N, Communications Security. These efforts include conceptual development, technical studies, system analysis and preparation of functional performance specifications and procurement documentation. The KYV-5 Advanced Narrowband Digital Voice Terminal crypto module, under separate development at the National Security Agency, will provide the plug-in module for the Tactical Terminal. The Department of Defense Secure Voice Consortium will continue to provide assistance in the evaluation of voice technology. Developments by the National Security Agency in the Executive Secure Voice Network terminal will complement Advanced Narrowband Digital Voice Terminal. The Advanced Narrowband Digital Voice Terminal, CV-3591, will be compatible with the Secure Voice Improvement Programs.

(U) WORK PERFORMED BY: Naval Research Laboratory, Washington, DC; Naval Electronic Systems Security Engineering Center, Washington, D.C. Contractors: ITT, Nutley, NJ; Dynastat, Austin, TX; Ketron, Wayne, PA; CNR, Newton, MA;Vought Corporation, Dallas, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Under the auspices of the Department of Defense Secure Voice Consortium, voice intelligibility and quality testing techniques were developed and applied to candidate voice processors. The achievement of successful results in consortium tests led to initiation of the Advanced Narrowband Digital Voice Terminal Program in FY 1976. In FY 19TQ, the Navy was tasked to proceed with the development of the military Tactical Terminal configuration of the Advanced Narrowband

Project: X0919
Program Element: 28010N
DoD Mission Area: 345 - Tactical Communications

Title: Advanced Narrowband Digital Voice Terminal
Title: Tri-Service Joint Tactical Communications Program (TRITAC), Navy
Budget Activity: 4 - Tactical Programs

Digital Voice Terminal. Efforts were initiated in FY 1977 under program element 33401N, Communications Security, which included development and review of a Joint Operational Requirement, completion of technical investigations, tradeoffs of Advanced Narrowband Digital Voice Terminal systems and terminal attributes, and definition of individual terminal configurations based on tradeoff analyses and life cycle cost criteria. Tested and evaluated QUINTRELL voice processors developed by the National Security Agency for application to the Advanced Narrowband Digital Voice Terminal design. Completed individual performance specifications for each Advanced Narrowband Digital Voice Terminal configuration in preparation for procurement activity in validation phase. Constructed and evaluated terminal/crypto module interface to demonstrate the Advanced Narrowband Digital Voice Terminal crypto module interface. Evaluated developmental software using the interface breadboard and prototype versions of the National Security Agency QUINTRELL processors. Prepared the systems effectiveness plan and Integrated Logistics Support concept and plan. Completed determination of life-cycle cost criteria, to include design-to-unit-production cost, and reliability and maintainability specifications. Prepared solicitation packages for Advanced Narrowband Digital Voice Terminal validation phase contracts. Coordinated preparation of crypto module solicitation package with the National Security Agency. Coordinated all specifications and solicitation packages with the military services and defense agencies. Released Request for Proposals for the validation phase of the equipment. Coordinated the joint service evaluation and development of the military Tactical Terminal configurations of the Advanced Narrowband Digital Voice Terminal. Completed design and fabrication of feasibility model version of the Tactical Terminal used to verify functional compliance with the CV-3591 specifications without adherence to final environmental and physical requirements. Coordination of the terminal development with the National Security Agency crypto module development accomplished through preparation of the KYV-5 Interfaces Control Document. Contract option for full-scale engineering development was exercised with one contractor (ITT, Nutley, NJ). Hardware and software design of the Full Scale Development Engineering Model equipment continued with the critical design review in July 1981.

2. (U) FY 1982 Program: During FY 1982 Full Scale Development contractor will continue Full Scale Engineering Development Model design, fabrication, assembly, and test and evaluation. A Joint Service Design Review will be conducted to determine acceptability prior to service test. Plans will be prepared for Development Test and Evaluation and Initial Operational Test and Evaluation. A Request for Proposals for a Miniaturized Terminal advanced development model will be released, proposals reviewed and a single contractor selected, and predevelopment planning for the Miniaturized Terminal will be completed.

3. (U) FY 1983 Planned Program: Development Test and Evaluation and Initial Operational Test and Evaluation will be initiated in FY 1983 using the ITT Full Scale Engineering Development Model terminals and the final engineering models from the National Security Agency KYV-5 crypto development. Advanced Development of the Miniaturized Terminal will continue.

4. (U) FY 1984 Planned Program: The Test and Evaluation phase will be completed. Joint Production Review and Approval for Service Use will be obtained and a Request for Procurement for production Tactical Terminal will be issued. Advanced Development of the Miniaturized Terminal will continue.

Project: X0919 Title: Advanced Narrowband Digital Voice Terminal
Program Element: 28010N Title: Tri-Service Joint Tactical Communications Program (TRITAC), Navy
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Production of the Tactical Terminal will begin in FY 1985. Initial operational capability available in FY 1987. Full Scale Development of the Miniaturized Terminal will be initiated in FY 1986 with service test scheduled for FY 1988 and production in FY 1989

6. (U) Milestones: Not applicable.

7. (U) RESOURCES (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0919	Advanced Narrowband Digital Voice Terminal	7,807	7,777	7,753	7,527	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63206N
DoD Mission Area: 371 - Self-Protection
Title: Airborne Electronic Warfare Equipment
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9,958	9,687	10,490	7,353	Continuing	Continuing
W0638	Airborne Defensive Electronic Countermeasures	6,937	8,180	8,852	5,609	Continuing	Continuing
W0640	Miniature Expendable Jammers	3,021	1,507	1,638	1,744	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides tactical Naval and Marine Corps aircraft with advanced technology self defense equipment and expendables which operate against threat weapons systems that utilize the Radio Frequency portion of the electromagnetic spectrum. Provides Electronic Warfare Support Measures equipment for electronic warfare support aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue Radar Warning Receiver component and subsystem improvements, Advanced Defensive Electronic Countermeasures jamming technique development, Aircraft Jam/Signal ratio measurements, Electronic Warfare equipment integration support, radar warning receiver, jammer programs with the Air Force, Electronic Warfare Software Support Activity development, Helicopter Radar Warning Receiver, and jamming programs with the Army and Navy/Air Force Countermeasure program.

As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are the result of refined cost estimates and budget adjustments and reflect overall decreases of $481 in FY 1981, $436 in FY 1982 and $542 in FY 1983.

Program Element: 63206N
DoD Mission Area: 371 - Self-Protection

Title: Airborne Electronic Warfare Equipment
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,280	10,439	10,123	11,032	Continuing	Continuing
W0638	Airborne Defense Electronic Countermeasures	7,609	7,339	8,545	9,314	Continuing	Continuing
W0639	Spread Spectrum Intercept and Direction Finding	1,607	*	*	*	*	*
W0640	Miniature Expendable Jammers	2,064	3,100	1,578	1,718	Continuing	Continuing

* Funding transferred to Program Element 35885G Tactical Cryptologic Activity.

Project No.	Title	FY 1981 Acutal	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy							
APR-43 (Project W0638-TW)		4,221	10,197	14,357	20,015	51,000	100,700
Quantity		(0)	(50)	(77)	(108)	(210)	(445)

Program Element: 63206N
DoD Mission Area: 371 - Self-Protection

Title: Airborne Electronic Warfare Equipment
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Radar warning equipment and electronic countermeasures using both combined and individual jamming and deceptive techniques are being developed/modified for protection of tactical aircraft from radar-controlled weapons and associated systems. Improved chaff/dispensers and low powered, self-contained, relatively inexpensive expendable jammers are being developed to provide jamming and/or confusion to enemy acquisition, Ground Control Intercept radars and fire control tracking radars.

(U) RELATED ACTIVITIES: Air Force and Army-related efforts are formally coordinated through the Joint Tactical Coordinating Group Countermeasures Subgroup and informally in various joint development planning meetings, exchange of project reports, and use of Test and Evaluation facilities. Joint/cooperative programs are underway in the areas of [redacted] Radar Warning, Radar Cross Section reduction technology, Active Tail Warning.

(U) WORK PERFORMED BY: In-house: Pacific Missile Test Center, Point Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Weapons Center, China Lake, CA; Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren, VA. Contractors: Sanders Associates, Inc., Nashua, NH; Applied Technology, Sunnyvale, CA; Lundy Electronics, Inc., Pompano Beach, FL; SWL Inc., McLean, VA; LORAL, Yonkers, NY; Rockwell International, Tulsa, OK; TRACOR, Austin, TX; Texas Instruments, Dallas, TX; Northrup, Rolling Meadows, IL; SEDCO, Long Island, NY and three others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed the APR-27/ALQ-51/81/88/91/100/126 Electronic Countermeasures equipment. Modifications to the APR-25/27 resulted in the ALR-45/50 equipment. Conducted test and evaluation of ALQ-126/129 and Radar Warning Receivers. Participated in Air Force program to equip aircraft with interceptor/missile tail warning. Development of ALE-39, ALE-41, and AM-6988A (POET) completed. [redacted] expendable brassboard development model simulator tested in coordination with ALQ-126B. Completed testing of feasibility models of reduced volume chaff stores.

[redacted] Completed Advanced Airborne Expendable Decoy concept analysis phase. Continued Radar Warning Receiver component and subsystem improvements. Developed Advanced Defensive Electronic Countermeasure jamming techniques. Investigated advanced concepts for reprogramming Electronic Countermeasures systems, aircraft Jamming/Signal measurements, and Navy/Air Force [redacted] countermeasures program. Continued Electronic Warfare Software Support Activity support, and radar cross section reduction and completed APR-43 development and flight testing. Developed [redacted] Initiated development of cross polarization concept, and Electronic Warfare equipment integration support. Continued participation in helicopter radar warning receiver defensive electronic countermeasures evaluations, and jammer development with U.S. Army for application to the Marines. Continued Radar Warning Receiver program with U.S. Air Force and Jammer Advanced Development Program.

Program Element: 63206N
DoD Mission Area: 371 - Self-Protection

Title: Airborne Electronic Warfare Equipment
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue Radar Warning Receiver component subsystem improvements, Advanced Defensive Electronic Countermeasures jamming techniques development, Jam/Signal ratio measurements, Electronic Warfare equipment integration support, and radar warning receiver and jammer programs with U.S. Air Force and Navy/Air Force countermeasures program. Conclude antenna concept development and feasibility investigation of electronic countermeasures programmability. Continue Electronic Warfare Software Support Activity development and development of cross polarization techniques. Perform additional simulator testing of developmental models. Fabricate simulator test feasibility models. Complete testing with feasibility models of improved chaff stores/block. Fabricate feasbility model of rocket motor Complete concept design of an Advanced Airborne Expendable Decoy and fabricate/test high risk hardware.

3. (U) FY 1983 Planned Program: Continue Radar Warning Receiver component and subsystem improvements, Advanced Defensive Electronic Countermeasure jamming technique development, aircraft Jamming/Signal ratio measurements, Electronic Warfare equipment integration support, radar warning receiver and jammer programs with the Air Force and helicopter radar warning receiver and jamming programs with the Army, and Tri-Service Countermeasure program and initiate full scale development of advanced transmitter for EA-6B application. Continue cross polarization technique development. Continue Electronic Warfare Software Support Activity development. Continue chaff dispenser/expendable jammer developments, including Engineering Development Models development of Advanced Airborne Expendable Decoy and expendables. Fabricate feasibility model Continue chaff dispenser/expendable jammer developments.

4. (U) FY 1984 Planned Program: Continue development in areas of electronic warfare techniques, vehicle signatures extension of electronic warfare frequency coverage, development of improved reliability/maintainability and further development of field reprogrammability. Continue full scale development of advanced transmitter for EA-6B and initiate integration effort for EA-6B. Continue chaff dispenser/expendable jammer developments.

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

6. (U) Milestones: Not applicable.

Project: W0638
Program Element: 63206N
DoD Mission Area: 371 - Self-Protection

Title: Airborne Defensive Electronic Countermeasures
Title: Airborne Electronic Warfare Equipment
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Radar warning equipment and electronic countermeasures using both combined and individual jamming and deceptive techniques are being developed/modified to protect tactical aircraft from radar controlled weapons and associated systems. Development, flight test and analysis conducted to determine radar cross sectional area for Navy tactical aircraft. Joint (USAF/USN) development of advanced, high power, J-band transmitter for EA-6B aircraft.

(U) RELATED ACTIVITIES: Air Force and Army related efforts are formally coordinated through the Joint Tactical Coordinating Group Countermeasures Subgroup and, informally, in various joint development planning meetings, exchange of project reports, and use of Test and Evaluaton facilities. Joint/cooperative programs are underway in the areas of Radar Warning, Radar Cross Section reduction technology, Active Tail Warning and Countermeasures. Joint EF-111, EA-6B, and J-band jamming transmitter developments are coordinated through the EF-111 SPO and the USAF Avionics Laboratory.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Point Mugu, CA; Naval Air Development Center, Warminster, PA; Naval Research Laboratory, Washington, DC; Naval Air Test Center, Patuxent River, MD; Naval Ocean Systems Center, San Diego, CA; Naval Weapons Center, China Lake, CA. Contractors: Sanders Associates, Inc., Nashua, NH; Loral Electronics Systems, Yonkers, NY; Applied Technology, Sunnyvale, CA; SWL Inc., McLean, VA; Rockwell International, Tulsa, OK; Computer Sciences Corporation, Oxnard, CA; Raytheon, Goleta, CA; SEDCO, Long Island, NY.

PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed the APR-27/ALQ-51/81/88/91/100/126 Electronic Countermeasures equipment. Modifications to the APR-25/27 resulted in the ALR-45/50 equipment. Conducted test and evaluation of ALQ-126/129 and radar warning receivers. Participated in Air Force program to provide missile/interceptor tail warning for fighter aircraft. Continued Navy/Air Force countermeasures program with Air Force/Army and continued the Helicopter Radar Warning Receiver program with U.S. Army. Completed analysis of various active jamming techniques against new or revised radar types now considered potential threats. Continued radar warning receiver component and subsystem improvements, Advanced Defensive Electronic Countermeasures jamming techniques development. Initiated and coordinated with the U.S. Air Force development of cross polarization concept. Completed AN/APR-43 development, and flight testing. Monitored development of active tail warning system for fighter and attack aircraft. Continue electronic warfare equipment integration support. Continued radar warning receiver and jammer programs with Air Force and participated in helicopter radar warning receiver and jammer developments with U.S. Army. Continued tri-service countermeasure program. Investigated advanced concepts for reprogramming Electronic Countermeasures systems. Developed a wide band Radar Warning Receiver antenna. Participated in development of solid state amplifier. Initiated investigation for achieving high efficiency Traveling Wave Tube components. Continued Electronic Warfare Software Support Activity development.

Project: W0638
Program Element: 63206N
DoD Mission Area: 371 - Self-Protection

Title: Airborne Defensive Electronic Countermeasures
Title: Airborne Electronic Warfare Equipment
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue radar warning receiver component and subsystem improvements, Advanced Defensive Electronic Countermeasure jamming technique development, aircraft Jamming/Signal ratio measurements, Electronic Warfare equipment integration support, radar warning receiver and jammer programs with the Air Force, and helicopter Radar Warning Receiver and jamming programs with the Army, and Navy/Air Force Countermeasure program. Continue flight test of cross polarization technique brassboard. Conclude antenna development. Continue Electronic Warfare Software Support Activity development. Continue participation in helicopter radar warning development with the Army.

3. (U) FY 1983 Planned Program: Continue Radar Warning Receiver component and subsystem improvements, Advanced Defensive Electronic Countermeasures jamming technique development, aircraft Jamming/Signal ratio measurements, equipment integration support, radar warning receiver and jammer programs with the Air Force, and helicopter radar warning receiver and jamming programs with Army and Tri-Service countermeasures. Initiate full scale development of transmitter for EA-6B application. Continue cross polarization technique development. Continue Software Support Activity development.

4. (U) FY 1984 Planned Program: Continue development in the areas of techniques, vehicle signatures, extension of electronic warfare frequency coverage, improved equipment reliability/maintainability and further development of field reprogrammability. Continue full scale development of advanced transmitter for EA-6B and initiate integration effort for EA-6B.

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0638	Airborne Defensive Electronic Countermeasures	6,937	8,180	8,852	5,609	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63208N
Title: Undergraduate Jet Flight Training System (VTXTS)
DoD Mission Area: 225 - Air Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,209	4,985	9,654	24,076	TBD	TBD
W1142	Undergraduate Jet Flight Training System (VTXTS)	1,209	4,985	9,654	24,076	TBD	TBD
	Quantity (Test and Evaluation)						(4)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Increasing operating and support costs and impending obsolescence of present flight training aircraft require development of a cost effective replacement. The complementary aspects of flight training (flight, simulation, and academics) must be integrated to develop an effective and affordable system.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Pre-Full Scale Development source selection completed in FY 1982. Sustaining Engineering contract signed with McDonnell Douglas Nov 1981, with subsequent award planned for Pre-Full Scale Development contract(s) to develop system/subsystem specifications, reduce technical risk, definitize program plans and fund Full Scale Development transition effort by contractor(s). The increase from FY 1982 to FY 1983 was caused by a decrease in the FY 1982 program resulting from a Congressional reduction. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: +$137 reprogrammed in FY 1981. The reduction of -$7594 in FY 1982 results from Congressional reduction and program guidance. At the direction of the Congress, reprogramming actions are probable. The decrease in FY 1983 of -3,331 reflects the Navy application of R&D budget reductions.

Program Element: 63208N
DoD Mission Area: 225 - Air Warfare Support

Title: Undergraduate Jet Flight Training System (VTXTS)
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1981 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,263	1,072	12,579	12,985	TBD	TBD
W1142	Undergraduate Jet Flight Training System (VTXTS)	4,263	1,072	12,579	12,985	TBD	TBD
	Quantity (Test and Evaluation)						(4)

(U) OTHER APPROPRIATION FUNDS: Not determined.

Program Element: 63208N
Dod Mission Area: 225 - Air Warfare Support

Title: Undergraduate Jet Flight Training System (VTXTS)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: As documented in the Mission Element Need Statement, a need exists to provide an optimized replacement for the present system to meet future pilot training requirements. Present training aircraft assets will begin reaching service life ceilings in the late 1980's. This program will explore alternatives for satisfying this need. Options ranging from maintaining existing trainer aircraft to acquisition of a totally new system will be examined and defined. Parallel competitive contracts have been awarded for industry exploration of alternatives. The program has been structured to focus on a system of ground and flight equipment that will provide aviators equal to or better than those currently being produced while minimizing acquisition and ownership costs. The entire spectrum of alternatives to fulfill this need will be summarized for the Defense Systems Acquisition Review Council. The McDonnell-Douglas HAWK based concept was awarded a sustaining engineering contract in November 1981. A Pre-Full Scale Development contract is planned for award in CY 1982.

(U) RELATED ACTIVITIES: Technology Base studies of requirements and conceptual systems were conducted with exploratory development funds from Navy Program Element 62241N, Aircraft Technology, to provide sufficient data to document the need for Milestone Zero. The Navy and the Air Force remain firm in the conviction that the USN Undergraduate Jet Flight Training System and the USAF Next Generation Trainer (Basic), as the systems are now envisioned, will provide both services, Basic and Advanced training requirements in the future. To this end, the Navy is tasked to ensure that all requirements, schedules, programming and budgeting are coordinated with the Air Force. An initial coordination meeting between the Air Force and Navy Directors of Aviation Training has been followed by weekly meetings between the program coordinators for the Navy Undergraduate Jet Flight Training System and the Air Force Next Generation Trainer. Also, an Air Force observer was present at source selection for the Undergraduate Jet Flight Training System conceptual development phase and will be present for the pre-Full Scale Development source selection. A Memorandum of Understanding between the Air Force and the Navy, of 5 May 1981, formalized tasking to the services to ensure that VTXTS and next generation trainer would be developed with capabilities to be used by both services, if the need arises.

(U) WORK PERFORMED BY: In House: Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA; Naval Air Propulsion Center, Trenton, NJ; Naval Air Test Center, Patuxent River, MD; Naval Air Engineering Center, Lakehurst, NJ; and Naval Education and Training Command, Pensacola, FL; Naval Aviation Center, Indianapolis, IN, and Naval Research Laboratory, Washington, D.C. Contractors: McDonnell Douglas Corporation, Long Beach, CA; British Aerospace Corporation, Surrey, England.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Operational requirements were defined by the Chief of Naval Operations in coordination with user commands. In-house conceptual trainer aircraft were defined to meet the proposed training requirements. Industry was solicited to develop and study the feasibility of their own proposed conceptual training systems. Industry studies were also conducted to define the cost/feasibility of modified existing NATO trainer aircraft. Industry studies were conducted with exploratory development funds. In-house analysis and summarization of study data performed. Initiated Undergraduate Jet Flight

Program Element: 63208N
Dod Mission Area: 225 - Air Warfare Support

Title: Undergraduate Jet Flight Training System (VTXTS)
Budget Activity: 4 - Tactical Programs

Training System (VTXTS) Program. Prepared and released a Request for Quotation to industry for conceptual development and exploration of alternatives. Proposals received and in-house evaluation and source selection completed. Six parallel contracts for exploration of system alternatives awarded to British Aerospace Corp., Grumman Aerospace Corp., Lockheed Corp., McDonnell-Douglas Corp., Northrop Corp., and Rockwell International Corp. In-house analyses and investigations of key development issues conducted.

2. (U) FY 1982 Program: Completed evaluation of Pre-Full Scale Development and conducted source selection. McDonnell-Douglas awarded sustaining engineering contract. Evaluate proposed Undergraduate Jet Flight Training System concepts and prepare program documentation for Milestone I. Defense Systems Acquisition Review Council (DSARC) I scheduled in mid-FY 1982. Award of Pre-Full Scale Development contract to validate, moderate-to-high risk technical and programmatic issues identified in industry proposals, and to develop system and subsystem specifications.

3. (U) FY 1983 Planned Program: Complete Pre-Full Scale Development Phase contract effort. In-house analysis of industry Pre-Full Scale Development efforts. Preparation for Defense Systems Acquisition Review Council (DSARC) II scheduled mid-to-late FY 1984. Prepare and release a Full Scale Development Request for Proposals and evaluate industry responses.

4. (U) FY 1984 Planned Program: Subject to availability of funds, award Full Scale Development contract. Detailed engineering efforts, R&D subsystem component ordering, detail production planning and commence fabrication of R&D aircraft and simulators.

5. (U) Program to Completion: Conduct full scale engineering development and required test and evaluation of selected system. Obtain Approval for Service Use and phase into training operations to ensure a continued output of quality jet aviators.

6. (U) Milestones:

	Milestones		Date
a.	Mission Element Need Statement (MENS) approval		June 1979
b.	DSARC I	(November 1981)*	July 1982
c.	DSARC II	(October 1983)*	July 1984
d.	Initial Training Capability (ITC)		1987
e.	Full Training Capability (FTC)		1988

* Dates in parentheses are those shown in the FY 1982 Descriptive Summary.

The milestone dates have been revised in accordance with OSD guidance.

Program Element: 63208N
DoD Mission Area: 225 - Air Warfare Support

Title: Undergraduate Jet Flight Training System (VTXTS)
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION:

1. (U) Development Test and Evaluation: The VTXTS Test program will evaluate and assess the technical and operational characteristics through an integrated and extensive developmental four major equipment groups, namely, airplanes, training simulators, computer-aided instruction devices, and a training management system. The program is currently in the concept development phase. No tests have been conducted to date. Full Scale Development, Development Test and Evaluation (DT-II) and Pre Full Scale Development, Development, Test and Evaluation (DT-I) test tasks will be tailored to the system selected. Currently four discrete Navy Preliminary Evaluations/Initial Operational Tests and Evaluations, and a Technical Evaluation/Initial Board of Inspection and Survey Trials are planned during Development Test-II following and during extensive contractor development hardware and software tests as detailed in Test and Evaluation Master Plan No. 786. Reliability and Maintainability development will be monitored and environmental qualification test criteria will be demonstrated.

2. (U) Operational Test and Evaluation: Operational testing will be conducted under the auspices of Commander, Operational Test and Evaluation Force in conjunction with the Chief of Naval Education and Training. VTXTS is exploring the alternate courses of action and has not fully defined reliability and maintainability goals and thresholds or a contractor supported or organic maintenance concept. Appropriate tests and monitor efforts will be implemented during Initial Operational Test and Evaluation to ensure system integration and efficient accomplishment of terminal learning objectives.

3. (U) System Characteristics

Airplane	Objectives	
	Thresholds	Goals
Service Ceiling	40,000 FT	-
Level Flight Speed	0.80 MACH	-
Approach Speed Region	115 KT	-
Sustained Level Turn G	3.0g	4.0g
Range (with IFR reverse)	1000nm	-
Servicing Time	15 min.	-
Mean Flight Hours Between Failure	2.5 HR	3.0 HR

Training Simulators - Type and number to be determined.
Computer-Aided Instruction Devices - To be determined.
Training Management System - To be determined.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63212N
DoD Mission Area: 371 - Self-Protection

Title: Tactical Air Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,577	4,781	1,493	2,470	Continuing	Continuing
WO436	Tactical Air Countermeasures	3,577	4,781	1,493	2,470	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element develops missile warning sets, decoys and jammers to protect Navy/Marine fixed-wing, tactical aircraft from infrared homing air-to-air and surface-to-air missiles. Countermeasure protection at this time is limited to the MK46 Mod 1C and MJU-8 flares and to the ALQ-123 infrared jammer which is designed to protect A7 aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Due to priorities in FY 1983 all effort under this program element is devoted to development of the decoy flare as follows: (a) Conduct test and evaluation on Advanced Development Model (ADM) of the decoy flare; (b) Begin engineering development of decoy flare; and (c) Begin advanced development of the decoy flare launcher. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are due to refined estimates of development cost and budget adjustments. A reduction of -$4,391 in FY 1983 is due to restructured priorities.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,084	3,929	4,897	5,884	Continuing	Continuing
WO436	Tactical Air Countermeasures	3,084	3,929	4,897	5,884	Continuing	Continuing

Program Element: 63212N
DoD Mission Area: 371 - Self-Protection

Title: Tactical Air Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 63212N
DoD Mission Area: 371 - Self-Protection

Title: Tactical Air Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project develops missile warning sets, decoys and jammers to protect Navy/Marine fixed-wing, tactical aircraft from infrared homing air-to-air and surface-to-air missiles. Serious threats include the AA-2, AA-7, AA-8, SA-7, SA-N-5, and SA-9, SA-13, SA-14 missiles. Candidate aircraft include the A-4, A-6, A-7, AV-8, F-14, and F/A-18. Countermeasure protection at this time is limited to: (a) the MK46 Mod 1C and MJU-8 flare and, (b) the ALQ-123 infrared jammer which is designed to protect A-7 aircraft from the infrared homing threat missile systems. A missile warning set is required to permit Additional investigation is needed to: (1) Assess the feasibility of adapting an Air Force pyrophoric flare for use with Navy dispensers. This flare would provide decoy radiation throughout the region. (2) Develop a Flare to counter missiles with (3) Develop a jammer which will defeat infrared missiles operating The current approach is to work only on the Flare in FY 1983 and FY 1984. Ongoing work is being postponed until FY 1985 when adequate funding will be available.

(U) RELATED ACTIVITIES: This project will be coordinated with Program Elements 63213N, Helicopter Infrared Countermeasures, and 64220N, Aircraft Infrared Signature Suppression, as an integral part of the total Infrared Countermeasures Suite development of Navy/Marine Corps aircraft.

(U) WORK PERFORMED BY: In-house: Pacific Missile Test Center, Pt. Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Weapons Support Center, Crane, IN; Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, IN. Contractors: ILC Technology, Sunnyvale, CA; Xerox Electro-Optical Systems, Pasadena, CA; SWL Inc., McLean, VA; Pacific Sierra Research Corp., Santa Monica, CA; Cincinnati Electronic Corp., Cincinnati, OH; Sanders Associate, Nashua, NH; General Electric Corp., Utica, NY; Georgia Institute of Technology, Atlanta, GA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This project was a new start in FY 1979. The ALQ-123 completed a series of successful live firings in August 1980, paving the way for a reliability update program. Air Force tests with liquid-type pyrophoric flares were monitored and Naval Surface Weapons Center evaluation of solid type pyrophoric flares showed the need for additional basic efforts in these areas. A flare has evolved. Missile warning set work consisted of:

Awarded three contracts for the preliminary design of a Directional Infrared Countermeasures System.

Program Element: 63212N
DoD Mission Area: 371 - Self-Protection

Title: Tactical Air Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Warning Set: Prepare performance specification and evaluate suitability of alternative approaches. Decoys: (a) Monitor Air Force work in liquid pyrophoric flares, and make 10 test models, (b) Evaluate solid pyrophoric flare materials, (c) Make 45 Rocket Motors for Flare and test free flight trajectory of Flare, (d) Begin fabrication of 38 Flare Advanced Development Models, and (e) Begin preparation for flare launcher Advanced Development Model. Jammers: (a) Conduct Test and Evaluation of updated ALQ-123, (b) Review results of Directional Infrared Countermeasures System design contracts, and define risk reduction efforts, and (c) Continue missile susceptibility.

3. (U) FY 1983 Planned Program: As a result of funding limitations in FY 1983, ongoing work on missile warning receivers, jammers, and pyrophoric flares is being delayed in favor of the Flare program as follows: (a) Conduct test and evaluation on Advanced Development Models of Flare, (b) begin Engineering development of Flare, and (c) begin development of Flare Launcher.

4. (U) FY 1984 Planned Program: Decoys: (a) Commence Test and Evaluation of Flare Engineering Development Models, (b) Test Launcher Advanced Development Models, and (c) Begin Enginering Development of Launcher.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63213N
DoD Mission Area: 371 - Self-Protection

Title: Helicopter Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,723	5,323	5,732	6,118	Continuing	Continuing
W0468	Heliborne Countermeasures	2,723	5,323	5,732	6,118	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element is developing a missile warning set, flare decoys and jammers to protect Navy/Marine helicopters from infrared homing missiles. Serious threats include the SA-7 and SA-9 missiles. Candidate aircraft include the AH-1, UH-1, CH-46, and CH-53.

(U) BASIS FOR FY 1983 RDT&E REQUEST: For the missile warning set: (a) Continue fabrication of Engineering Development Models; (b) Prepare for installation and testing. For the advanced helo decoy flare: (a) Conduct test and evaluation of dispensed Engineering Development Model Flares; (b) Make 800 flares for system tests. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Decriptive Summary and that shown in this Descriptive Summary are the results of refined cost estimates and budget adjustments.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,261	3,150	5,402	5,899	Continuing	Continuing
W0468	Heliborne Countermeasures	2,261	3,150	5,402	5,899	Continuing	Continuing

Program Element: 63213N
DoD Mission Area: 371 - Self-Protection

Title: Helicopter Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy						
ALQ-157 Infrared Jammer CH-46E	1,118	1,025	7,978	8,536	680	19,436
Quantity	0	0	(111)	(69)	(0)	(180)
ALQ-157 Infrared Jammer CH-53A/D	935	3,538	6,7500	6,378	0	14,416
Quantity	(1)	0	(60)	(53)	(0)	(113)
CH/RH-53 Missile Warning Receiver	0	0	0	0	20,148	20,148
Quantity	0	0	0	0	(207)	(207)

Project: 63213N
DoD Mission Area: 371 - Self-Protection

Title: Helicopter Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project develops warning sets, infrared decoys and infrared jammers to protect Navy/Marine helicopters from infrared homing missiles. Serious threats include the SA-7 and SA-9 missiles. Future threats include missiles operating at longer wave lengths and having greater range and maneuvering capability. Candidate aircraft include the UH-1, AH-1, CH-46, and CH-53. Countermeasures protection at this time consists of a limited number of first generation (hot metal) engine suppressors and ALE-29A chaff/flare dispensers. Research, Development, Test and Evaluation is needed to: (1) Complete development of the AAR ( ) missile warning set jointly with the Army, to provide warning and [illegible] and (2) develop an advanced flare system. This flare produces the output of current MK 46 flares. Jammer effectiveness/simulation efforts are accomplished in this project.

(U) RELATED ACTIVITIES: This project will be coordinated with Program Elements 63212N, Tactical Air Infrared Countermeasures, and 64220N, Aircraft Infrared Signature Suppression, as an integral part of the total Infrared Countermeasures Suite development of Navy/Marine Corps aircraft.

(U) WORK PERFORMED BY: In-house: Pacific Missile Test Center, Pt. Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Air Test Center, Patuxent River, MD; Naval Research Laboratory, Washington, DC; Naval Weapons Support Center, Crane, IN. Contractors: Xerox Electro-Optical Systems, Pasadena, CA; Aerojet ElectroSystems Company, Azusa, CA; SWL, Inc., McLean, VA; Honeywell Corporation, Lexington, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This project was first funded in FY 1979. The ALQ-157 Infrared Countermeasures progressed into preproduction. Army/Navy testing of the AAR-46 Advanced Development Model B Missile Warning Set was completed in December 1979. The AAR-46 showed considerable improvement over the Advanced Development Model A (AAR-41) in false target rejection, while retaining excellent detection capabilities. Much of the work needed to solicit Engineering Development Model proposals for the AAR-( ) was completed. In the decoy area, two approaches were developed: a centrifugal force dispenser and an impulse cartridge dispenser. Basic feasibility of the dispenser/flare was demonstrated during flight tests in 1979. The flares demonstrated good burn times, good kinematic characteristics (some flares had rising trajectories) and excellent decoying capabilities against the three infrared seekers used for the test. The impulse cartridge dispenser approach has been selected for continued development and the decoy system is now directed toward a 5-inch diameter flare and two 8-round dispensers.

2. (U) FY 1982 Program: For the Missile Warning Set: (a) Procure 8 Engineering Development Models and associated support equipment, and (b) Continue upgrade of sensors. For the Advanced Helo Decoy Flare: (a) Design and fabricate 8 Engineering Development Models of the dispenser, (b) Make 1100 flares for dispenser tests, and (c) design installation for CH-53E.

Project: 63213N
DoD Mission Area: 371 - Self-Protection

Title: Helicopter Infrared Countermeasures
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: For the Missile Warning Set: (a) Continue fabrication of Engineering Development Models and (b) Prepare for installation and testing. For the Advanced Helo Decoy Flare: (a) Conduct Test and Evaluation of dispenser Engineering Development Models, and (b) Make 800 flares for system tests.

4. (U) FY 1984 Planned Program: For the Missile Warning Set: (a) Conduct Test and Evaluation of Engineering Development Models, and (b) Continue upgrade. For the Advanced Helo Decoy Flare: Conduct System Test and Evaluation.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63214N
Title: Tactical Command and Control Communications Countermeasures
DoD Mission Area: 372 - Escort, Stand-off & Counter C3
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,499	6,284	7,258	7,755	Continuing	Continuing
WO642	Tactical Command and Control Communications Countermeasures	2,499	6,284	7,258	7,755	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop tactical command and control communications countermeasures equipment to replace the AN/ALQ-92 tactical communications jammer in the EA-6B aircraft. The project commenced in FY 1974.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue *ALQ-149 Engineering* Development Model develop and prototype installation on EA-6B. Continue ground support equipment development. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are the result of refined cost estimates and budget adjustments resulting in the following changes: FY 1981 -1,654, FY 1982 -599, and FY 1983 -248.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,596	4,153	6,883	7,506	Continuing	Continuing
WO642	Tactical Command and Control Communications Countermeasures	3,596	4,153	6,883	7,506	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 63214N
DoD Mission Area: 372 - Escort, Stand-off & Counter C3

Title: Tactical Command and Control Communications Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Develop tactical command and control communications countermeasures equipment to replace the AN/ALQ-92 Communications Jammer in EA-6B aircraft and to provide a tactical command and control communications countermeasures capability for tactical aircraft. The AN/ALQ-92 is a limited frequency system (100-150 MHz), has no analysis capability except operator aural analysis, generates severe electromagnetic interference within the aircraft, A Navy Decision Coordinating Paper to develop a replacement system for the AN/ALQ-92 and a system for tactical aircraft was approved. The project commenced in FY 1974. The systems were required to be capable of identifying and jamming communications signals be software programmable, and be compatible with on-board systems of candidate aircraft. Subsequent to the establishment of the original requirement for (ADO 33-60X), and the U.S. Marine Corps established a requirement to conduct tactical command and control communications countermeasures in the and frequency coverage to fill the gap between was required. As a result, the frequency coverage requirement was extended A system technical development plan and a design for the EA-6B, have been developed. The EA-6B system, the AN/ALQ-149, has completed advanced development. The Advanced Development Model consists of a acquisition, receiving and processing subsystem and

(U) RELATED ACTIVITIES: A USAF project under Program Element 63718F is developing an Air Defense Communications Jammer for bomber penetration operating in the band and intended USAF Program Element 64724F is developing command and control communications countermeasures to support tactical Air Forces from a dedicated stand-off jammer aircraft.

(U) WORK PERFORMED BY: In-house: Naval Avionics Center, Indianapolis, IN; Naval Research Laboratory, Washington, DC; Naval Air Test Center, Patuxent River, MD; Naval Surface Weapons Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA. Contractors: None.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A detailed threat study was conducted and a threat list has been compiled. A threat scenario has been developed. The frequency requirement for the system was modified to operate in response to the USMC requirement, and for the identification of the SA-4 data link frequencies. The development of an Advanced Development Model of a tactical command and control communications countermeasures system commenced under program element 63214N, Tactical Communications Jamming, in FY 1974 and fabrication of the system commenced at Naval Avionics Center, Indianapolis, in late FY 1975. A threat list was compiled, scenario developed, system design study completed and technical development plan completed and approved prior to commencement of Advanced Development Model fabrication at Naval Avionics Center. A secure laboratory facility

capable of testing the system in an appropriate environment has been developed at the Naval Research Laboratory. The AN/ALQ-149 Advanced Development Model fabricated at Naval Avionics Center was delivered to Naval Research Laboratory for Test and Evaluation during last quarter FY 1980 for secure laboratory evaluation. AN/ALQ-149 Engineering Development Model specifications statement of work and Request for Proposal were prepared. Fabrication and testing has been suspended due to inability to achieve pod and band width required. Completed tactical aircraft system feasibility study. USAF continued risk reduction studies, but no system that is feasible for Navy aircraft was identified. A antenna transmitting subsystem has been prototyped and tested. Completed Advanced Development Model test and evaluation. Award contract for Engineering Development Model of AN/ALQ-149.

2. (U) FY 1982 Program: Conduct competitive contractor selection process for engineering development model contract, select contractor and award contract. Commence AN/ALQ-149 Engineering Development Model development. Initiate prototype installation of ALQ-149 in EA-6B aircraft. Commence AN/ALQ-149 Ground Support Equipment design and fabrication.

3. (U) FY 1983 Planned Program: Continue AN/ALQ-149 Engineering Development Model development and prototype installation EA-6B. Continue ground support equipment development.

4. (U) FY 1984 Planned Program: Commence system contractor test program. Complete ground support equipment development. Commence Navy development/operational testing.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63219N
Title: Advanced Aircraft Armament System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,543	5,651	6,541	11,406	41,130	82,084
W0976	Suspension and Release Equipment	1,749	2,624	3,741	7,114	24,908	43,316
W0977	Stores Management System	2,831	2,005	2,290	4,292	16,222	31,034
W0978	Multiple Stores Ejector Rack	1,963	1,022	510	0	0	7,734

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Navy and Air Force aircraft historically have had unique armament systems. Consequently, each time a new weapon is developed the aircraft has to be modified at great expense to accommodate the new weapon. This program is attempting to correct that deficiency. Advanced Aircraft Armament System is the Navy's program to achieve aircraft/stores interoperability between future Navy and Air Force (and, where possible, NATO) fixed wing aircraft with current and future NATO and U.S. stores, through the development of joint-service Suspension and Release Equipment and Stores Management Systems electrical and mechanical standards for interfaces between aircraft armament subsystems. Validated standards will be utilized as design specifications for Advanced Development Model hardware for family of Suspension and Release Equipment and Stores Management System equipment which will achieve joint-service and NATO Interoperability. The Multiple Stores Ejection Rack was a near-term joint Navy and Air Force effort (Air Force lead) to provide a common multiple (two and four station) bomb rack for stores in the 1000 lb. class. The Multiple Stores Ejection Rack was to provide: (1) improved reliability, (2) tenfold decrease in maintainability requirements, (3) reduced logistic costs, (4) rack component part interchangeability, and (5) service interoperability with multiple racks. The multiple stores ejection rack development was discontinued due to high drag and schedule incompatibilities with the F-18 aircraft. The in-service multiple ejector racks will be updated where practical with the suspension and release equipment task making provisions for the future multiple stores ejector rack.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Development of the detailed Aircraft Armament Interoperability Interface standards and specifications will be a coordinated effort in accordance with the approved Navy/Air Force Joint Program Management Plan (Joint Advanced Development Plan). A detailed draft of the armament interface standards and specifications will be prepared as a basis for validation testing and Interservice and NATO evaluations and coordination. Contracts for major subsystems hardware and software will continue. System test bed instrumentation and validation equipment will be in for FY 1984 tests. Technology review and update will continue. Development of store and avionics simulators will be continued. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 63219N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Advanced Aircraft Armament System
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: +$282 in FY 1981 as a result of refinement of cost estimates including inflation, -$583 in FY 1982 and -$4,058 in FY 1983 as a result of Navy budget reductions. The increase in the total estimated cost by $14,709 reflects a restructuring of the program which requires an additional year of development and an increase in funding of $7,662 in the outyears.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,313	6,261	6,234	10,599	33,468	67,375
W0976	Suspension and Release Equipment	2,726	2,230	2,660	5,928	19,679	33,677
W0977	Stores Management System	2,098	1,784	2,539	4,153	13,789	25,659
W0978	Multiple Stores Ejector Rack	2,489	2,247	1,035	518	0	8,039

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63219N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Advanced Aircraft Armament System
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The objective of the Advanced Aircraft Armament System effort is to achieve aircraft/stores interoperability between future fixed wing aircraft with current and future stores. Interoperability will be achieved through the development and validation of joint-service electrical and mechanical interface standards for the following aircraft system interface areas: (1) armament subsystem to aircrew subsystem, (2) armament subsystem to aircraft subsystem, and (3) armament subsystem to stores. Aircraft equipment included in these areas are cockpit displays and controls, electrical wiring and power, avionics processors, stores management terminals, and suspension and release devices. The validated standards will be provided along with demonstrated technology concepts for the future development of a flexible and programmable stores management system and a minimum family of interoperable suspension and release equipment to achieve joint service and NATO Interoperability. Developers of future aircraft will design suspension and release and stores management equipment according to the validated standards, thereby reducing cost and proliferation of equipment. This will facilitate aircraft weapon load-out, reconfiguration, and enhance total mission flexibility and effectiveness. The validated equipment and standards will be utilized to formulate the U.S. position for NATO air armament interoperability. Project W0976, Suspension and Release Equipment, is associated with the "armament subsystem to stores" and "armament subsystem to aircrew subsystem" interfaces and includes stores, stores management data transfer, and suspension and release equipment. Interface specifications will be developed for pylon interfaces, three weight/size classes of racks, rail and eject missile launchers, multiple ejector racks, stores management data transfer and store attachment and release. In addition to the interface standards, this project will validate and test Advanced Development Model hardware for a family of parent racks, missile launchers, and store suspension and release components. Project W0977, Stores Management System, is associated with the "armament subsystem to aircrew subsystem" and "aircraft subsystem to armament subsystem" interfaces and includes cockpit displays and controls, electrical wiring and power, avionics processors, stores interface devices, and data transfer. Interface standards will be developed, validated, and tested. This project will validate equipment which will utilize common data communication and transfer. W0978, Multiple Stores Ejector Rack, was a joint Navy/Air Force development of a common multiple (two and four station) bomb ejector rack for stores in the 1000 lb. class. The Multiple Stores Ejection Rack was the first step towards bomb ejector rack interoperability between the services which provided significant improvements in reliability, maintainability and logistics costs. The Multiple Stores Ejector Rack development was discontinued due to high drag and schedule incompatibilities with the F-18 aircraft. The in-service stores multiple ejector racks will be improved where practical with the future rack being defined by the suspension and release equipment task.

(U) RELATED ACTIVITIES: The Suspension and Release Equipment and Stores Management System projects are being coordinated with the Air Force in accordance with a Memorandum of Agreement approved in September 1978. The associated Air Force program is Program Element 63601F "Conventional Weapons Technology." The Aircraft Armament Interoperable Interfaces and Advanced Aircraft Armament System are being coordinated with the Air Munition Requirements and Development Committee and the Joint Technical Coordination Group for Munitions Development. The Air Force Multiple Stores Ejection Rack effort is Program Element 64602F. The Multiple Stores Ejection Rack was being developed in accordance with the approved Joint Services Operational Requirement and Joint Development Plan. The Advanced Aircraft Armament System Program is currently developing Navy inputs to the NATO Standardization Air Armament Work Party.

Program Element: 63219N
Title: Advanced Aircraft Armament System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: W0976, Suspension and Release Equipment and W0977, Stores Management System - In-House: Naval Weapons Center, China Lake, CA (lead Navy laboratory); Naval Air Development Center, Warminster, PA; Naval Ordnance Station, Indian Head, MD; Naval Avionics Facility, Indianapolis, IN; Naval Weapons Evaluation Facility, Albuquerque, NM; Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center, Pt. Mugu, CA; Naval Surface Weapons Center, White Oak, MD. Contractors: Vought Corp., Dallas, TX; Batelle Memorial Institute, Columbus, OH. Other: Air Force Armament Test Laboratory, Eglin Air Force Base, FL. W0978, Multiple Stores Ejection Rack - In-House: Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; Naval Air Technical Services Facility, Philadelphia, PA; Naval Air Engineering Center, Lakehurst, NJ. Contractors: Western Gear Corp., Flight Division, Jamestown, ND. Other: Air Force Armament Test Laboratory, Eglin Air Force Base, Eglin, FL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Advanced Aircraft Armament System technology base established under Strike Warfare Weaponry Technology, Program Element 62332N, FY 1974 through FY 1976. Technology concepts have been successfully laboratory demonstrated. Joint Program Management Plan approved in March 1979 for the joint-service "Aircraft Armament Interoperable Interfaces Program." The Advanced Aircraft Armament System is the Navy portion of this program. Navy Decision Coordinating Paper written. Suspension and Release Equipment dual dependent ejector system demonstrated along with concepts for automatic swaybracing, missile launchers, and store attachment mechanisms providing integral store communication and power. Store interface, communication, and data transfer studies initiated for NATO Standardization Agreements. Joint-Service Interoperability stores list and data library established. Component functional requirements and architectural concepts identified. Advanced signaling and power requirements defined. Technology reviewed and first draft of Program Master Plan completed. Acquisition plan completed and approved. Advanced Medium Range Air-to-Air Missile Program coordination established. Service coordination with related advanced development efforts in displays and controls, avionics, and electrical power systems established. Initiated contractual procedures for the stores management system advanced development model hardware contract, which included finalization of the statements of work and specifications. Multiple Stores Ejector Rack feasibility and accuracy of the vertical ejection concept has been successfully demonstrated. Wind tunnel models of conceptual Multiple Stores Ejector designs completed. An eight month competitive design phase between the two contractors was conducted which ended with prototype hardware test and evaluation. Based on a source selection process, Western Gear, Flight Systems Division, Jamestown, ND, was selected for follow-on development. Reconfiguration studies for reduction of Aerodynamic drag completed. Completed initial qualification test program and development flight testing on high draft design. Discontinued the Multiple Stores Ejector Rack development and restructured the program to provide improved in-service Multiple Ejector Racks for the F-18 aircraft and for doing the stores management system and suspension and release equipment in sequence.

2. (U) FY 1982 Program: Continue joint-service development of armament interface standards. Service engineering analysis of armament interface standards. Coordination of Advanced Aircraft Armament System and Aircraft Armament Interoperability Interface

with parallel service development efforts in aircraft power, electronics, avionics, display and control. Complete contract awards for advanced armament equipment. Complete store data base analysis and finalize joint service store suite. Award Phase I stores management system advanced development model hardware contracts. Initiate suspension and release equipment system investigations and supporting technology development. Complete critical design review of stores management system advanced development model. Continue NATO advanced armament interface interoperability studies. Initiate cordination of armament interface standards and specifications with Naval Sea Systems Command for Air/Surface launched weapon system developments.

3. FY 1983 Planned Program: Evaluate advanced development model phase I contract efforts for stores management system and award contract for phase II and III. Continue stores management engineering support studies and analysis. Continue design standards and specifications review within NATO. Provide store and avionics simulators for validation testing of stores management system advanced development model. Continue coordination of suspension and release equipment technology development with stores management system advanced development model development. Continue suspension and release equipment system investigations and supporting technology development. Update draft interface standards of stores management system based on critical design review of advanced development model. Continue coordination of armament interface standards and specifications with Naval Sea Systems Command for air/surface launched weapon system development.

4. FY 1984 Planned Program: Delivery and integration of advanced development model stores management system hardware into the ground test lab and initiate validation testing. Complete stores management engineering support studies and analysis. Continue design standards and specifications review within NATO. Continue coordination of suspension and release equipment technology development with stores management system advanced development test and evaluation. Continue suspension and release equipment system investigations and supporting technology development and evaluation. Prepare statement of work and specifications for suspensions and release equipment advanced development model contract. Continue coordination of armament interface standards and specifications with Naval Sea Systems Command for air/surface launched weapon system developments.

5. (U) Program to Completion: Complete suspension and release equipment system investigations and supporting technology development, test and evaluation. Award contracts for Suspension and Release Equipment Advanced Development Model. Complete ground testing of validation hardware. Publication of standards, specification, and associated authorizing instructions for use in Aircraft Armament Interoperable Interface design control. Release completed aircraft/stores installation data base to cognizant agencies. Continue follow-up of standardization agreements through ratification procedures under auspices of NATO Military Agency for Standardization, Air Armament Working Party. Coordinate with development plans for selected suspension and release and stores management subsystems for use in future aircraft and conversions of existing aircraft. Coordinate armament interface standards and specification with air/surface launched weapon developments.

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63220N
Title: Lift Fan Development
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	10,000	36,284	43,185	Continuing	Continuing
W1689	Tilt Fan Demonstrator Aircraft	0	10,000	31,442	36,075	Continuing	Continuing
W1690	Propulsive Lift Systems	0	0	4,842	7,110	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides for advanced development of fixed wing, Vertical/Short Take-Off and Landing technology for Navy and Marine Corps missions. This element is separate from JVX and will pursue technologies needed to field an effective V/STOL aircraft whose performance will exceed that possible under the JVX program. Project W1689, Lift Fan demonstrator Aircraft, initiates development and testing of two powered lift demonstrator aircraft. A specific thrust of this R&D effort will be lift fan technologies; alternative technologies will also be evaluated. A goal of this program is to reduce catapult and aresting gear dependency by the end of this century and is designed to result in proof-of-concept demonstrator concept. Project W1690, Propulsive Lift Systems, initiates development of a propulsive lift research device to be developed in cooperation with NASA Lewis Research Center. This device termed a multiple propulsion system demonstrator, would be assembled from an existing engine and existing turbofans and would be used to determine the viability of several new propulsive concepts such as the tandem fan. In addition it would be used to develop component hardware such as guide vanes, inlets, augmentors and nozzles. Project W1690 would additionally fund investigations of critical propulsion issues such as reingestion, short term engine ratings, engine thermal distortion tolerance, high bleed compressors and high power transmission components.

(U) BASIS FOR FY 1983 RDT&E REQUEST: W1689, Tilt Fan Demonstrator Aircraft. An objective is to award an FY 82 competitive contract to initiate activities which include aircraft detail design, wind tunnel model fabrication, control system simulation and engine modification (if required). These activities will continue in FY 83. W1690, Propulsive Lift Systems. Issue competitive Request for Proposal and award contract for development of the multiple propulsion system demonstrator research device. Initiate investigations of critical propulsion technology issues.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The descriptive summary for this program element was contained within PE 63257 in FY 1982. Congress appropriated 10,000 in FY 1982 for Project W1689 and directed the Navy to establish this new program element.

Program Element: 63220N
DoD Mission Area: 235 - Naval Warfare Support

Title: Lift Fan Development
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: None

(U) OTHER APPROPRIATION FUNDS: None

Program Element: 63220N Title: Lift Fan Development
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Navy foresees a requirement to develop new operational aircraft capable of vertical and short takeoff and landing. Selected aircraft designs and their associated propulsive lift systems which provide vertical and short takeoff and landing capability have matured to the point that flight demonstration is the appropriate next development objective. Other propulsive lift systems, of high potential worth, have not matured to the point where flight demonstration is currently possible. The multiple objectives of this program element include (1) the development and flight demonstration and test of a turbofan aircraft which uses propulsive lift principles and conceivably, when defined and missionized under the context of an acquisition program, will meet multiple support and tactical Navy mission requirements; (2) the advancement, through hardware development, of specific propulsive lift system concepts in addition to that system selected under Project W1689, (3) propulsive system hardware component development applicable to the propulsive system selected under Project W1689 as well as to alternative concepts and (4) the investigation of critical propulsion technology issues. These projects were described under PE 63257N, Vertical/Short Take-Off and Landing Aircraft Development in the FY 1982 Descriptive Summary. The Congress did not approve an appropriation for PE 63257N but did direct establishment of a Tilt Fan development program. This program element responds to that direction.

(U) RELATED ACTIVITIES: Development of critical advanced technology subsystem efforts for incorporation into any Navy/Marine Corps advanced aircraft, including propulsive lift concepts are included in: PE 63202 Projects W0577 Advanced Aircraft Electrical Systems and W0597 Advanced Integrated Display System; PE 63210, Project W0582 Propulsion Component Technology; PE 63217N, Projects W0446 Advanced Airborne Early Warning Radar, W0516 Avioptics, W0885 Mod Avionics Packaging and W0892 Info Handling Systems; PE 63251N Project W0647, Composite Structures for Advanced Aircraft. A program oriented towards a short takeoff and landing demonstration aircraft is PE 63257N, Project W1658, A-6 Short Take-Off and Landing Demonstrator. Related exploratory development efforts are under PE 62241N, Aircraft Technology.

(U) WORK PERFORMED BY: In House: Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ, NASA Ames Research Center; NASA Lewis Research Center. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In prior years, technology and study efforts were funded under Project W0477, Advanced Vertical/Short Takeoff and Landing (Type A), Project W1148, Vertical/Short Takeoff and Landing Technology, and Project 62241N, Aircraft Technology, which form the basis and justification to initiate the projects contained in this program element. These efforts include the Sea Based Air Master Study, Initial Industry Studies, expansion of NASA simulation facilities, ground based development of a specific propulsive lift candidate design, and the development of avionics, structures and propulsion technologies applicable to any next generation aircraft.

Program Element: 63220N
DoD Mission Area: 235 - Naval Warfare Support

Title: Lift Fan Development
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Project W1689, Tilt Fan Demonstration Aircraft. Select a specific technology approval and issue a competitive Request for Proposal and award contract for development of a subsonic lift cruise fan demonstration aircraft. Initiate detail design, wind tunnel model fabrication, control system simulation and engine modification (if required). Project W1690. Refine project scope as may be necessitated by the contract which is awarded under Project W1689.

3. (U) FY 1983 Planned Program: Project W1689. Continue detail design, wind tunnel model fabrication, control system simulation and engine modification, as required. Project W1690. Issue competitive Request for Proposal and award contract for the multiple propulsion system demonstrator research device. Initiate investigations of critical propulsive lift technology issues. Initiate cooperative projects with NASA.

4. (U) FY 1984 Planned Program: Project W1689. Continue detail design, wind tunnel model fabrication and test and engine modification and test. Complete control system simulation. Commence fabrication of flight articles. Project W1690. Continue fabrication of the multiple propulsion system demonstrator. Continue NASA cooperative projects. Continue investigation of critical propulsive lift technologies.

5. (U) Program to Completion: Project W1689. Complete fabrication of two flight demonstrator aircraft. Conduct shore-based and sea based testing from both large and small sea based air platforms. Project W1690. Complete fabrication of the multiple propulsion system demonstrator. Investigate and test multiple propulsive lift system concepts. Develop and test propulsive lift systems component hardware. Continue Navy/NASA cooperative projects. Continue investigations of critical propulsive lift technologies as is required.

6. (U) Milestones:

Milestone	Date
W1689 Aircraft Mockup	December 1984
Complete detail design	March 1985
First Flight	September 1986
Navy evaluation shore based	September 1987
Navy evaluation sea trials	June 1988
W1690 Research Device Fabrication Complete	January 1985

Project: W1689 — Title: Tilt Fan Demonstrator Aircraft
Program Element: 63220N — Title: Lift Fan Development
DoD Mission Area: 235 - Naval Warfare Support — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Navy foresees a requirement to develop new operational aircraft capable of vertical and short takeoff and landing. Selected aircraft designs and their associated turbofan propulsive lift systems which provide vertical and short takeoff and landing capability have matured to the point that flight demonstration is the apporpriate next development objective. This Project initiates the competitive development and flight testing of two demonstrator turbofan aircraft. These aircraft may serve as prototypes for multiple support and tactical mission applications. The primary purpose of the demonstrators is to provide proof-of-concept of the aerodynamic and propulsive systems involved. Further configuration definition and missionization would occur within the context of a major acquisition program.

(U) RELATED ACTIVITIES: The development of critical advanced technology subsystems for incorporation into any Navy/Marine Corps advanced aircraft. This includes propulsive lift concepts that are included in PE 62241N, Aircraft Technology, PE 63202N Projects W0577 Advanced Aircraft Electrical Systems and W0597 Advanced Integrated Display System; PE63210N, Project W0582 Propulsion Component Technology, PE 63217N, Projects W0446 Advanced Airborne Early Warning Radar, W0516-CC Avioptics, W0885 Mod Avionics Packaging and W0892 Info Handling Systems, PE 63251N, Project W0647, Composite structures for Advanced Aircraft. Project W1690 of this Program Element provides for intensive investigation of propulsion issues. PE 63257N, Project W1658, A-6 Short Take-Off and Landing Demonstrator provides for flight demonstration of a specific short takeoff and landing concept.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; NASA Ames Research Center; NASA Lewis Research Center. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In prior years. technology and study efforts were funded under Project W0477, Advanced Vertical/Short Takeoff and Landing (Type A), Project W1148, Vertical/Short Takeoff and Landing Technology, and Project 62241, Aircraft Technology. These efforts, which form the basis and justification for this program, include the Sea Based Air Master Study, Initial Industry Studies, expansion of NASA simulation facilities, ground based development of a specific propulsive lift candidate design, and the development of avionics, structures and propulsion technologies applicable to any next generation aircraft.

2. (U) FY 1982 Program: Select a specific technology approach and issue a competitive Request for Proposal and award contract for development of a V/STOL demonstrator aircraft. Initiate detail design, wind tunnel model fabrication, control system simulation and engine modification (if required).

Project: W1689 Title: Tilt Fan Demonstrator Aircraft
Program Element: 63220N Title: Lift Fan Development
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue detail design, wind tunnel model fabrication, control system simulation and engine modification, as required.

4. (U) FY 1984 Planned Program: Continue detail design, wind tunnel model fabrication and test, and engine modification and test. Complete control system simulation. Commence fabrication of flight articles.

5. (U) Program to Completion: Complete fabrication of two flight demonstrator aircraft. Conduct shore-based and sea based testing from both large and small sea based air platforms.

6. (U) Milestones:

Milestone	Date
1. Aircraft Mockup	December 1984
2. Complete detail design	March 1985
3. First Flight	September 1986
4. Navy evaluation shore based	September 1987
5. Navy evaluation sea trials	June 1988

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1689	Tilt Fan Demonstrator Aircraft	0	10,000	31,442	36,075	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63221N
Title: AV-8B PLUS
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	5.0	0	TBD	TBD	TBD
W1692	AV-8B PLUS	0	5.0	0	TBD	TBD	TBD

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: There are potential variants of the AV-8B aircraft which have not been examined. For example, one potential variant would integrate a light-weight radar system into the AV-8B. There are estimated to be approximately 8 existing or developmental radar systems that might be appropriate. This program will analyze these. Of particular interest is the potential offered by an adaptation of the Sea Harrier radar and weapons system into the AV-8B.

(U) BASIS FOR FY 1983 RDT&E REQUEST: FY 1982 funds are sufficient to permit the intial analysis of potential variant configurations.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) There was no FY 1982 Descriptive Summary for this project. However, in FY 1982 Congress appropriated 5,000 for this program and directed establishment of a Program Element.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: None.

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63221N Title: AV-8B PLUS
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: In FY 1982 Congress appropriated $5 million for the AV-8B PLUS and directed establishment of a new Program Element. This FY 1982 appropriation will be used to determine capability, performance, cost and availability dates of several potential variants of the AV-8B aircraft. Previous appropriations were used to evaluate the merits of a specific variant, which integrated the F/A-18 aircraft weapons system, within the context of the Sea Based Air Master Study, and to fund initial stages of engine development for this specific variant. This specific variant was evaluated as having performance deficiencies relative to foreseen requirements for Navy light weight fighter and attack aircraft and is seen as non-cost-effective, since development cost is compounded by a requirement for engine development. Other less expensive variants will be evaluated in this Program Element, in particular, integration of the AV-8B and the existing Sea Harrier radar and weapon system will be examined.

(U) RELATED ACTIVITIES: The USMC AV-8B aircraft is being developed under Program Element 64214N. Development activities under this Program Element will be fully coordinated and integrated with activities under 64214N.

(U) WORK PERFORMED BY: In House: Naval Air Development Center, Warminster, PA. Contractors: McDonnell Douglas Aircraft Corp., St. Louis, MO.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishmetns: A specific variant of the AV-8B which presumed integration of the F/A-18 weapons system was evaluated in 1978 and 1979 as part of the Sea Based Air Master Study. In 1980 preliminary definition of an uprated Pegasus engine, to support this specific variant, was accomplished.

2. (U) FY 1982 Program: Conduct an evaluation of potential variants of the AV-8B aircraft.

3. (U) FY 1983 Planned Program: Continue engineering development of selected candidate configuration(s), if any.

4. (U) FY 1984 Planned Program: To be determined.

5. (U) Program to Completion: To be determined.

6. (U) Milestones:

	Date
1. Award study contract	April 1982
2. Configuration selection	July 1982
3. Commence engineering development	August 1982

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63228N
DoD Mission Area: 353 - Naval Warfare

Title: Aircraft Carrier Anti-Submarine Warfare Module
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,838	4,601	4,162	4,592	Continuing	Continuing
S0517	Aircraft Carrier Anti-Submarine Warfare Module	3,838	4,601	4,162	4,592	Continuing	Continuing
	Quantity			(DT&E/OT&E)			(1)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for development of software/hardware improvements necessary to upgrade the anti-submarine warfare link in the aircraft carrier chain of command between air anti-submarine warfare weapon systems, the Navy tactical data system, and other elements of the carrier combat system. The principal objective is the provision of a capability aboard aircraft carriers for pre-mission, in-flight, and post-mission information exchange, storage, correlation, processing and display of anti-submarine warfare data as an integral part of the combat direction system in support of anti-submarine warfare operations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: FY 1983 funds are requested to fund continuing efforts towards the detailed design, development and integration of phase one of the updated carrier anti-submarine module program software and hardware as well as independent verification and validation of the design and specifications to insure compliance with carrier combat system integration requirements. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Decreases in FY 1981 (-$136) and FY 1982 (-$67) due to decrease in inflation and an increase in FY 1983 (+$457) results from program restructure. Aircraft Carrier Anti-Submarine Warfare Module (S0157) established as a continuing program.

Program Element: 63228N
DoD Mission Area: 353 - Naval Warfare

Title: Aircraft Carrier Anti-Submarine Warfare Module
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,478	3,974	4,668	3,705	15,022	55,064
30517	Aircraft Carrier Anti-Submarine Warfare Module	3,478	3,974	4,668	3,705	15,022	55,064

(U) OTHER APPROPRIATION FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Navy	10,235	5,204	7,567	7,698	Continuing	Continuing
Quantity					(14)	(14)

Program Element: 63228N
DoD Mission Area: 353-Naval Warfare

Title: Aircraft Carrier Anti-Submarine Warfare Module
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The program develops a carrier-based capability to provide pre-mission, in-flight and post-mission information exchange, storage, correlation, processing and display of anti-submarine warfare data for flight crews and for the planning and execution functions aboard ship. The module directly supports sea-based air anti-submarine warfare weapons systems (S-3 and SH-3 aircraft), the anti-submarine tactical aircraft (sonobuoy launch and relay) pod and coordinates land-based anti-submarine warfare aircraft operating in support of the carrier. The module provides the means to achieve full utilization of aircraft capabilities through computer integrated avionics and digital communications systems. The computer-to-computer interface between the module and the Navy Tactical Data System serves to integrate anti-submarine warfare command and control with the other warfare command functions aboard the aircraft carrier.

(U) RELATED ACTIVITIES: Program Element 64217N, S-3 Weapons Systems Improvement Program will be supported by the module, and Program Element 64219N, project X0486, Anti-Submarine Warfare Operations Center, will use some common hardware.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center (lead laboratory), Warminster, PA. Contractor: Sperry-UNIVAC, St. Paul, MN; Hughes Aircraft, Fullerton, CA; Autonetics, North American Rockwell, Anaheim, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Ten of the planned twelve module installations for existing carriers have been completed through FY 1978. Equipment for the remaining two ship systems has been delivered and will be installed in FY 1982. The thirteenth system (CVN-71) is being funded through the Shipbuilding and Conversion, Navy, appropriation. The inital systems were installed to support the S-3A airborne weapon system introduction and subsequent carrier deployments. The module systems were developed with the primary function of supporting the S-3A and SH-3D/H aircraft plus a limited secondary function of command and control interface with the carrier combat system, specifically the Navy Tactical Data System. The current module operating software program has limited compatibility with the Navy Tactical Data System and its digital communications link (link-11). Planning and preliminary design analysis for an update to the module commenced in FY 1978. During FY 1978 support was given to the development of the carrier combat system top level documentation inclusive of a top level requirement, combat system design requirement, and combat system operational design. Additionally, a preliminary design of the future module system as documented in a procurement data package has been completed. The procurement data package consists of a system specification, the system operational specification in final form, test plans and system test specifications along with baseline hardware specifications and interface design specifications between module and other carrier combat system elements. Procurement for updated system hardware has been initiated with some items under evaluation. The mission software development contract was awarded in FY 1981.

2. (U) FY 1982 Program: Continue development of mission software. Continue the procurement of system integration software for the system development facility. Continue test and evaluation of the developed hardware. Continue carrier combat system integration.

Program Element: 63228N
DoD Mission Area: 353-Naval Warfare

Title: Aircraft Carrier Anti-Submarine Warfare Module
Budget Activity: 4-Tactical Programs

3. (U) FY 1983 Planned Program: Complete development of the mission software as well as integration and test of hardware and software at the development facility.

4. (U) FY 1984 Planned Program: Conduct full scale test and evaluation inclusive of system integration test with the other elements of the carrier combat system. Complete the technical evaluation and correct deficiencies as required. Conduct the operational evaluation on-board a designated ship and obtain approval for service use.

5. (U) Program to Completion: Procure, integrate and install the module update system in all designated carriers. Phase two will develop interfaces with combat system elements which were not available during inital upgrade design. This is a continuing program.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63254N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Air Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,238	5,896	13,994	19,924	Continuing	Continuing
W0493	ARAPAHO	700	3,000	0	0	0	17,691
W1292	Advanced Anti-Submarine Warfare Avionics	1,538	2,896	4,179	5,674	Continuing	Continuing
W1301	Advanced Lightweight Helicopter Sonar	0	0	0	4,192	18,471	22,663
W1624	Broadband Acoustic Systems	0*	0*	9,815	10,058	13,324	33,197

*Broadband Acoustic System funded under Program Elements 63254N/W1292 and 63259N in FY 1981 and FY 1982.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provide improved fixed wing and rotary wing anti-submarine warfare effectiveness through development of enhanced sensor location and control, processing, post-processing, data recording and display capabilities; and, in the case of tethered sonar, improved sensor performance against the advanced high speed evasive submarine threat. Shallow water anti-submarine warfare requirements will receive continuing consideration in the development of future ASW sensors and avionics. Particular focus is given to the enhancement of capabilities to exploit broadband target signals.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Advanced Anti-Submarine Warfare Avionics - As a result of FY 1982 assessments of infrasonics, adaptive filtering, aural enhancement, and cardioid processing, continue development of appropriate candidates. Continue development of recall-store capability. Initiate development of enhanced input signal conditioning/beamforming for UYS-1, operator interaction/operational aides, advanced active and passive processing and display improvements. Broadband Acoustic Systems - Initiate new project, W1624, which reflects the increase in funds from FY 1982 to FY 1983. Continues development of distributed broadband sensor initiated in Program Element 63259N, Advanced Search Sensors, and associated processing and display modifications initiated in project W1292. Advanced Lightweight Helicopter Sonar - Submit request authority to negotiate for an FY 1984 new start. As this is a continuing program, the above funding, includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only. For Project W0493, project W1301 and project W1624, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 63254N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Air Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: The FY 1981 total program estimate exceeds the value shown in the FY 1982 Descriptive Summary by $688, as the result of reprogramming as payback into ARAPAHO (+$700) and a general reduction for inflation (-$12). The total FY 1982 program estimate exceeds the value shown in the FY 1982 Descriptive Summary by $2,962, as the result of Congressionally directed funding of ARAPAHO (+$3,000) and a general reduction for inflation (-$38). The total FY 1983 program estimate exceeds the value shown in the FY 1982 Descriptive Summary by $8,805 as the result of a program restructure (-$1,010) that slips the initiation of Advanced Lightweight Helicopter Sonar one year and starts a new project, W1624, Broadband Acoustic Systems (+$9,815).

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL PROGRAM ELEMENT	13,704	1,550	2,934	5,189	Continuing	Continuing
W0472	P-3 Modernization Program	9,690	*	*	*	*	*
W0476	Digital Acoustic Sensor Simulator	2,854	**	**	**	**	**
W0493	ARAPAHO	100	0	0	0	0	13,991
W1492	Advanced Anti-Submarine Warfare Avionics	1,060	1,550	2,934	4,014	Continuing	Continuing
W1301	Advanced Lightweight Helicopter Sonar	0	0	0	1,175	16,173	17,348

* Project W0472 incorporated into Program Element 64221N, P-3 Modernization Program.
** Project W0476 transferred to Program Element 64266N, Advanced Signal Processor.

(U) OTHER APPROPRIATIONS FUNDS: Not Applicable

Program Element: 63254N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Air Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Advanced Anti-Submarine Warfare Avionics - This project integrates and augments several on-going avionics improvements projects previously conducted within other programs. The trend toward reduced detectability of the advanced threat submarine, the need for more rapid and effective prosecution of acoustic contacts, the severe demands imposed by the shallow water anti-submarine warfare environment, the additional processing and display requirements for advanced sensors, and the limited rate at which avionics hardware and software changes can be introduced represent a complex set of requirements for the development of avionics functions with increased capability, performance, and flexibility while maintaining interoperability and compatibility with existing aircraft suites. Increased emphasis upon rapid, accurate localization requires improved sonobuoy location, bearing accuracy, passive tracking, and weapon drop capabilities. The diverse nature of threat submarine characteristics, as well as heavy demands upon the operator, require development of adaptive processing capabilities (which minimize required operator selection and interaction), and automatic or machine-assisted detection and classification. Shallow water requirements for larger numbers of sensors per unit area present increased receiving and processing demands. Bandwidth extension requires tradeoffs of capabilities and limited avionics changes which must be weighed against the threat. Processors such as the AQA-7 and CP-1323/AQS-13E may require hardware adjuncts such as adaptive pre-filtering while additional Advanced Signal Processor functions can generally be effected through software changes. Broadband Acoustic Systems - Full exploitation of target signal characteristics and accommodation of potential threat changes requires development of broadband processing algorithms, display formats, and appropriate sensor placement and telemetry to achieve useful recognition differentials for broadband target-generated energy. Advanced Lightweight Helicopter Sonar - The special problem of inner-zone protection by rotary wing aircraft in a high noise environment requires improved platform detection capabilities which may be affected through improved lightweight tethered sonar and by integration of advanced sonobuoy systems.

(U) RELATED ACTIVITIES: Program Element 62711N, Undersea Target Surveillance, provides for initial determination of feasibility of candidate technology approaches. Program Element 63259N/W1010, Advanced Passive Sensors, provides complementary advanced development of sensor candidates. Program Element 64261N/W0480, Passive Advanced Sonobuoy, provides for engineering development of selected sensor systems.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren, VA. Contractors: To Be Determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Advanced Anti-Submarine Warfare Avionics - Initiated P-3C flight testing using Adaptive Controlled Phased Array Antenna for sonobuoy location. Installed equipment in special project aircraft and conducted operational data collection and analysis. Procured and evaluated four Adaptive Prefiltering and Listening Equipments. Initiated simulation of the Fabricated and tested prototype Ambient Noise Directivity Estimator for Vertical Line Array Directional Frequency Analysis and Recording. Assembled laboratory processing facility for broadband signals incorporating cross-correlation algorithm with doppler compensation and declutter capabilities.

Program Element: 63254N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Air Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

Initiated analysis of acoustic data from experiments and operational exercises. Initiated implementation of coherent adaptive processing algorithm for preliminary evaluation as a broadband/narrowband processing technique. Initiated Directional Command Active Sonobuoy shallow water performance investigation and OL-82 processing modifications. Advanced Lightweight Helicopter Sonar - Conducted acoustic performance modeling/predictions and mission/operational analysis for several candidate sensors in the inner zone direct support role. ARAPAHO (A portable, autonomous, aviation facility that can be rapidly installed aboard cargo ships). Completed ARAPAHO land based helicopter landing demonstration and a shipboard loading demonstration.

2. (U) FY 1982 Program: Advanced Anti-Submarine Warfare Avionics - Complete [redacted] data collection analysis and assessment. Initiate development of a Recall-Store capability for [redacted] history. Initiate Major System Mode-11 (new modular Advanced Signal Processor software) development relating to exploitation of broadband signals. Implement and test selected broadband processing algorithms, particularly inter-buoy and intra-buoy cross-correlation and Directional Frequency Analysis and Recording variance. Conduct performance/mission/operations/cost/ configuration analyses to guide selection of broadband sensor and advanced processing candidates. ARAPAHO - Complete sea based feasibility demonstration. If supported by results of feasibility demonstration, initiate upgrade of the portable facility for at-sea tactical tests.

3. (U) FY 1983 Planned Program: Advanced Anti-Submarine Warfare Avionics - Continue with selected efforts in [redacted] as indicated by the FY 1982 assessment. Continue improved display, interactive control, or input signal conditioning and [redacted] developments as appropriate. Continue development of Recall-Store, multi-sensor data integration and advanced passive and active processing developments. Broadband Acoustic Systems - Initiate new project W1624. Continue development of broadband sonobuoy and associated processing/ display modifications for AQA-7 and UYS-1 which were initiated in project W1292.

4. (U) FY 1984 Planned Program: Advanced Anti-Submarine Warfare Avionics - Continue development of selected options from prior years. Continue Recall-Store, multi-sensor data integration/display/operator interface improvements, related Advanced Signal Processor stand-alone software and advanced active and passive processing techniques. Advanced Lightweight Helicopter Sonar - Initiate advanced development. Broadband Acoustic Systems - Continue development of distributed field broadband sonobuoy and associated broadband processing and display modifications.

5. (U) Program To Completion: Advanced Anti-Submarine Warfare Avionics - (Continuing Program) Transition Recall-Store development and other selected modifications to existing airborne anti-submarine warfare systems to engineering development. Continue development of avionics improvements including data recording and multi-sensor correlation. Develop and incorporate broadband processing improvements. Develop and test stand alone Advanced Signal Processor software for new processing modes using the advanced acoustic processing techniques. Advanced Lightweight Helicopter Sonar - Continue development and complete helicopter lightweight sonar transition to engineering development in FY 1988. Broadband Acoustic Systems - Complete advanced development and test of broadband sonobuoy system.

Program Element: 63254N
DoD Mission Area: 733 - Anti-Submarine Warfare

Title: Air Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not applicable.

Project: W1624 Title: Broadband Acoustic Systems
Program Element: 63254N Title: Air Anti-Submarine Warfare
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for the development of advanced passive sonobuoy and processing systems capable of Since current air Anti-Submarine Warfare acoustic systems this effort will introduce a more balanced, passive acoustic capability. Broadband processing techniques that can use existing sonobuoy sensors offer the quickest route to a fleet capability. Existing acoustic processors such as the AN/AQA-7 in P-3 aircraft will require hardware changes to provide broadband processing, while the Advanced Signal Processor (AN/UYS-1) can be programmed to perform these functions through software changes. This approach will be taken to provide a near-term solution, New sensors for broadband will be necessary to field a long term broadband capability Additionally advanced broadband processing, post-processing and displays may have to be developed to accommodate these new sensors.

(U) RELATED ACTIVITIES: Program Element 62711N, Undersea Target Surveillance, provides for initial determination of feasibility of candidate technology approaches. Program Element 63259N/W1010, Advanced Passive Sensors, provides complementary advanced development of sensor candidates. Program Element 64261N, Acoustic Search Sensors (Engineering), provides for engineering development of selected sensor systems. Program Element 64266N, Advanced Signal Processor, project W0476, provides for engineering development of Advanced Signal Processor.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA. Contractors: TBD

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The options for both near-term and long-term broadband acoustic systems for Anti-Submarine Warfare aircraft have been investigated. System concept studies have been initiated. A major sea test to provide calibrated acoustic data for evaluation of a wide range of broadband sensor and processing options was conducted in August 1981. A laboratory processing facility for broadband signals, incorporating cross-correlating algorithms with doppler compensation and declutter capabilities was assembled, and analysis of acoustic data from research and development experiments and operational exercises was completed. Initiated design of a broadband correlation processing mode for the Advanced Signal Processor (AN/UYS-1). Initiated development of a broadband processing modification for the AN/AQA-7. Efforts supporting the initiation of this project in FY 1981 and FY 1982 are in Advanced Passive Sensors (63259N/W1010) and Advanced Anti-Submarine Warfare Avionics (63254N/W1292).

Project: W1624 Title: Broadband Acoustic Systems
Program Element: 63254N Title: Air Anti-Submarine Warfare
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: The FY 1982 effort completes the options definition phase to determine both near-term and long-term development that will effectively address the broadband threat target. Selected sensor and processing developments will begin. Contracts will be awarded for advanced development of a broadband optimized sonobuoy and for advanced broadband processing algorithm development for Advanced Signal Processor (AN/UYS-1) application.

3. (U) FY 1983 Planned Program: Integration of broadband cross-correlation processing into Advanced Signal Processor Major System Mode-11 software will begin in FY 1983. Development of a broadband sonobuoy and advanced broadband processing to support advanced sensors will continue. Sea tests of the broadband sonobuoy will be conducted to validate the system design and to confirm the acoustic performance. Complete development of AN/AQA-7 broadband processing modification to support Engineering Change to P-3 aircraft acoustic processing systems. Determine what advanced processing, post-processing and displays are necessary to fully exploit the capabilities of the advanced broadband sensors being developed.

4. (U) FY 1984 Planned Program: Continue advanced broadband processing development. Complete broadband distributed field sonobuoy advanced development and initiate engineering development.

5. (U) Program To Completion: Complete broadband sensor and processing development. Begin integrating advanced broadband processing techniques into Major System Mode-11 software in FY 1985. Complete broadband sonobuoy by FY 1986. Complete development of advanced broadband processing techniques in FY 1987.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1624	Broadband Acoustic Systems	0*	0*	9,815	10,058	13,324	33,197

*Funded under Advanced Passive Sensors (63259N/W1010) and Advanced Anti-Submarine Warfare Avionics(63254N/W1292) in FY 1981 and FY 1982.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63257N
DoD Mission Area: 235 - Naval Warfare Support

Title: Vertical/Short Take-Off and Landing Aircraft Development
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,304	0	6,700	16,800	19,200	47,004
W1148	Vertical/Short Take-Off and Landing Technology	4,304	0	0	0	0	4,304
W1658	A-6 STOL Demonstrator	0	0	6,700	16,800	19,200	42,700

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides for advanced development of fixed wing, Vertical/Short Take-Off and Landing technology for projected Navy and Marine Corps requirements. The Navy foresees a requirement to develop new or modified aircraft capable of vertical and short takeoff and landing for mission needs which encompass the entire spectrum of Naval and Marine Corps aviation. Project W1658, A-6 Short Take-Off and Landing Demonstrator: Provides for an advanced Short Take-Off and Landing high lift technology demonstrator aircraft by integrating the 2-dimensional Augmented Deflector Exhaust Nozzle (ADEN) with blown flaps on an A-6 aircraft which has been modified with F-404 afterburning engines. The 2-dimensional nozzle vectored thrust technology provides a promising configuration feature for future fighter and attack aircraft. The demonstrator will have the capability of a maximum carrier landing gross weight of 45,000 lbs in lieu of the present 33,500 lbs, for the same main landing gear axle load. This capability will permit landing at significantly higher fuel weights and will permit unexpended high value weapons to be returned to base. The goal in this project is to structure a program to achieve the earliest prudent flight evaluation for the A-6 ADEN demonstrator.

(U) BASIS FOR FY 1983 RDT&E REQUEST: W1658, A-6 Short Take-Off and Landing Demonstrator. Initiate concept analytical verification of applicability to service operational aircraft and establish final configuration of blown flaps/ADEN combination through wind tunnel model and flight simulator tests of flight dynamics including simulated system failure modes. Issue request for proposal and award contract for an A-6 ADEN demonstrator aircraft which will provide substantially increased landing gross weight capability in addition to Short Take-Off and Landing performance capability. The above funding profile includes outyear escalation and encompasses all work anticiapted on this project.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: A deletion of all funds for Project W1148, Vertical/Short Takeoff and Landing Technology due to Congressional action on the FY 1982 Budget Request. A deletion of Project W1245, AV-8B Plus due to FY 1982 direction to establish a separate Program Element for this project. A total program increase of 200 for Project W1658, A-6 Short Take-Off and Landing Demonstrator resulting from restructuring for a slip of 2 months in program start date.

Program Element: 63257N
DoD Mission Area: 235 - Naval Warfare Support

Title: Vertical/Short Take-Off and Landing Aircraft Development
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,954	14,946	75,897	90,213	Continuing	Continuing
W1148	Vertical/Short Takeoff and Landing Technology	4,954	14,946	7,597	73,413	Continuing	Continuing
W1245	AV-8B PLUS Concept Formulation	0	0	0	0	0	7,970
W1658	A-6 STOL Demonstrator	0	0	8,300	16,800	17,400	42,500

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63257N
Title: Vertical/Short Take-Off and Landing Aircraft Development
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Navy foresees requirements to develop new operational aircraft capable of vertical and short takeoff and landing. An immediate acquisition program commencement is considered premature, but the need exists to advance the technology base for these promising future sea based aircraft concepts. This element provides for development and flight demonstration of a concept which represents the application of two technologies which could lead to an enhanced operational capability for the A-6 aircraft. W1148, Vertical/Short Takeoff and Landing Technology. This project was a new start in FY 1979, resulting from program reorientation and redesignation of project W0477, Advanced Vertical/Short Takeoff and Landing (Type A). Most FY 1979 FY 1980 funds were utilized for the Sea Based Air Master Study, a comprehensive investigation of future sea based aircraft force alternatives. This study indicated no clear preference between Vertical/Short Take-Off and Landing and Catapult Assisted Takeoff and Arrested Landing (CTOL) aircraft force options for the missions and scenarios studied but did point out potential significant advantages that could accrue from Vertical/Short Take-Off and Landing force elements. Therefore, the Vertical/Short Take-Off and Landing Technology project was oriented towards advancing promising technologies, primarily in air vehicle and propulsion disciplines, to reduce risk and increase confidence in the viability of new designs prior to making an acquisition program commitment, with the objectives of preserving the option for Navy introduction of advanced vertical takeoff and short takeoff and landing aircraft, advancing their technology base and reducing the duration of future development programs. The Congress did not support these objectives and terminated this project in FY 1982. W1658, A-6 Short Take-Off and Landing Demonstrator: By providing vectored thrust using an Augmented Deflector Exhaust Nozzle (ADEN) coupled to GE F-404 afterburning engines and by blowing bleed air over a trailing edge flap, analysis shows that the A-6 aircraft can be given excellent Short Take-Off and Landing characteristics at reasonable takeoff gross weights. In addition, since these devices will permit reductions in landing speeds of about 20 knots, the aircraft can be landed on a carrier some 15,000 lbs heavier without changing the current landing gear. This will permit landings with unexpended fuel and high value weapons. This program provides for additional engineering design, modification of an A-6 airframe to incorporate these devices and flight testing to demonstrate operational applicability.

(U) RELATED ACTIVITIES: Development of critical advanced technology subsystem efforts for incorporation into any Navy/Marine advanced aircraft, including Vertical/Short Takeoff and Landing, are covered under: Program Element 63202N Projects W0577 Advanced Aircraft Electrical systems and W0597 Advanced Integrated Display System; Program Element 63210N, Project W0582 Propulsion Component Technology; PE 63217N, Projects W0446 Advanced Airborne Early Warning Radar, W0516 Avioptics, W0885 Mod Avionics Packaging and W0892 Info Handling Systems; PE 63251N, Project W0647, Composite Structures for Advanced Aircraft. Programs oriented towards development of Vertical/Short Take-Off and Landing technology demonstration aircraft are PE 63220, Projects W1689, Tilt Fan Demo Aircraft and W1690, Propulsive Lift Systems and PE 63221, Project W1692 AV-8B PLUS. Exploratory development efforts are covered under PE 62241N, aircraft Technology.

(U) WORK PERFORMED BY: In House: Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ. Contractors: Grumman Aerospace Corp., Bethpage, NY. General Electric Corp., Cincinnati, OH.

Program Element: 63257N
DoD Mission Area: 235 - Naval Warfare Support

Title: Vertical/Short Take-Off and Landing Aircraft Development
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: WO588, Thrust Augmented Wing Prototype. Project initiated in 1972. Demonstrator fabrication, assembly, ground test and initial tethered hover test continued through FY 1978 demonstrating 83% of predicted vertical thrust and 51% of augmenting thrust goal. Remedial development program initiated to resolve augmentor deficiencies, optimize design and improve performance. Small scale parametric tests to date have demonstrated substantial performance improvements for revised augmentor layout. W1148, Vertical/Short Takeoff and Landing Technology - New start in FY 1979. Supported Sea Based Air Master Study. Completed technical studies to provide ship, aircraft and weapons alternatives for future sea based air force options. Began evaluation of cost and effectiveness of force options. Conducted and assessed contractor Vertical/Short Take-Off and Landing Initial Industry Studies in which nine industry contractors were tasked to assess the adequacy of the Chief of Naval Operations Vertical/Short Take-Off and Landing operational concept against the projected threat, develop weapon system performance goals, identify critical technologies and alternative development programs. In cooperation with NASA, expanded flight simulation facilities to enhance simulation testing of all new development aircraft. Supported the development of avionics, structures and propulsion technologies applicable to any next generation aircraft.

2. (U) FY 1982 Program: None

3. (U) FY 1983 Planned Program: Conduct a system analysis and preliminary installation design of an F-404 engine, ADEN and high lift system modification to an A-6 aircraft. Initiate procurement action for detailed design, fabrication and flight test of a modified A-6 aircraft. Award contract for design, fabrication and flight test. Begin fabrication of components. Conduct analytical analysis, wind tunnel testing, simulation of flight and low speed characteristics, complete ADEN testing and commence design modifications to an A-6 aircraft.

4. (U) FY 1984 Planned Program. Continue component fabrication and A-6 airframe modification.

5. (U) Program to Completion: Completion of design modification to an A-6 aircraft. Completion of second ADEN by GE and tests on F-404 engine. Installation of engines/ADEN by GAC and tests. Demonstration flights as approved by Navy.

6. (U) Milestones:

Milestones	Date
1. Contract Award	Jan 1983
2. Flight Test	1985

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63259N
Title: Acoustic Search Sensors (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,795	4,639	8,622	TBD	Continuing	Continuing
W1010	Advanced Passive Sensors	3,795	4,639	8,622	TBD	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Development of improved acoustic sensors and associated aircraft equipments to improve air anti-submarine warfare acoustic performance to counter the current and projected submarine threat.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue advanced development of horizontal line array sonobuoy (formerly called air deployed array sonobuoy). This will include over-the-side testing of acoustic models and the initial development of stand-alone aircraft processing to be used in future operational testing. Initial development of an advanced (e.g., volumetric) array sonobuoy for application to threat signal detecting and localization (complement to 63254N/W1624, Broadband Acoustic Systems). As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profiles in the FY 1982 Descriptive Summary and that shown in this descriptive summary reflect general escalation reductions for FY 1981 (-134), FY 1982 (-67), and FY 1983 (-271).

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL PROGRAM ELEMENT	4,895	3,929	4,706	8,893	Continuing	Continuing
W0495	Dwarf Sonobuoy	3,003	*	*	*	*	*
W1010	Advanced Passive Sensors	1,892	3,929	4,706	8,893	Continuing	Continuing

* Funded in Program Element 64261N, Acoustic Search Sensors (Engineering)

Program Element: 63259N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Advanced)
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63259N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Advanced Passive Sensors includes development of both a tactical air-deployed large area search sonobuoy system and an advanced sonobuoy. The large area sensor is a sonobuoy system to be used by patrol and sea-based anti-submarine warfare aircraft against current as well as future generation threat submarines: (1) for protection of surface forces against long range missile attack, (2) for localization/conversion of surveillance contacts, (3) area search in surveillance areas in crisis situations requiring immediate location and attack, in real time, of deployed submarine forces, (4) for [ ] and (5) for temporary anti-submarine warfare [ ] to monitor crisis deployment of undersea forces. The Advanced Array Sonobuoy development will complement 63254N/W1624 (Broadband Acoustic Systems) through advanced development of a volumetric array or equivalent high performance system to provide [ ] detection capability against [ ] signals radiated by threat submarines in the 1990's.

(U) RELATED ACTIVITIES: Program Element 64261N, Acoustic Search Sensors (Engineering), provides engineering development of advanced sensors; in FY 1981, Project WO495, Dwarf Buoy, transitioned to this element. Program Element 63254N, Air Anti-Submarine Warfare, provides related advanced processing capabilities; this element includes an FY 1983 start of Project W1624, Broadband Acoustic Systems, which complements the Advanced Array Sonobuoy development effort.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA. Contractors: Haseltine, Braintree, MA; Magnavox, Ft. Wayne, IN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed and tested over-the-side propelled array acoustic feasibility models demonstrating predicted performance of the Horizontal Line Array approach. Performed operational and cost analyses providing basis for selection of Horizontal Line Array candidate approach and overall system cost effectiveness. Issued Horizontal Line Array system specifications, conducted packaging/system design studies and initiated procurement of acoustic test models configured to an A-size packaging goal. Procured hardware and conducted Long Life Commandable Vertical Line Array, Directional Frequency Analysis and Recording sonobuoy field sampling demonstration. Further development of this concept is to be considered under 64261N/WO480 (Passive Advanced Sonobuoy). Fabricated and tested an All-Directional Frequency Analysis and Recording line array for consideration as a potentially improved [ ] localization sensor, as part of August 1981, acoustic experiments. Fabricated and tested tethered sonobuoy pairs and vertically separated dual element sensors in the latter experiment to determine usefulness for [ ] acoustic detection.

Program Element: 63259N
DoD Mission Area: 293 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Advanced)
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Conduct design tradeoffs with respect to incorporation of [ ] fabricate and test over-the-side hydromechanical models and complete system design. Conduct acoustic sensor fabrication, acoustic testing and data analysis to establish near-term and far-term candidate for Broadband Acoustic Systems development. Development of a near-term candidate sensor for broadband will be pursued under 63254N/W1624 (Broadband Acoustic Systems) beginning in FY 1983.

3. (U) FY 1983 Planned Program: Complete testing of Horizontal Line Array over-the-side acoustic models. Initiate design and development of Advanced Array Sonobuoy as a far-term candidate for detection capability.

4. (U) FY 1984 Planned Program: Transition Horizontal Line Array sonobuoy to engineering development under 64261N/W0480, (Passive Advanced Sonobuoy). Continue development of Advanced Array Sonobuoy for high performance applications.

5. (U) Program to Completion: Transition broadband Advanced (Volumetric) Array Sonobuoy to engineering development in FY 1985. Continue advanced development of advanced array concepts for improved performance, cost effectiveness and conservation of air-platform resources against the evolving submarine threat.

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63260N
Title: Airborne Mine Countermeasures
DoD Mission Area: 234 - Mine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12,338	20,635	21,566	24,904	TBD	TBD
W0528	Advanced Airborne Mine Countermeasures Equipment	9,141	12,755	12,305	12,433	33,711	125,391
W0529	Airborne Minehunting System	1,629	6,398	9,261	12,471	38,795	89,959
W1239	Buried Mine Minehunting System	1,568	1,482	0	0	TBD	TBD

Systems to be used in the outyears through Operational Test and Evaluation (Quantity):

W0528: AN/ALQ-166 Magnetic Sweep, (2); Controlled Depth/Rapid Deployed Moored Sweep (2); Magnetic Environmental Measuring Equipment (2); Acoustic Sweep, AN/ALQ-160 (2); Advanced Acoustic Sweep (2)

W0529: Relocation Sonar, AN/AQS-17 (2); Neutralization Device (TBD); Reconnaissance System (2).

W1239: Buried Mine Minehunting System (TBD)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for development of airborne mine countermeasures systems that will enable surface combatants, amphibious force ships and logistic support ships to operate with relative safety in mineable water areas in support of the Navy's sea control and projection missions. The capabilities are required to counter known and projected mine threats. These developments will provide a [redacted]

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project W0528, Advanced Airborne Mine Countermeasures Equipment. Obtain approval for service use and finalize documentation for production of AN/ALQ-166 Magnetic Sweep and controlled Depth/Rapid Deploy Moored Sweep. Complete technical and operational evaluations of Magnetic Environmental Measuring Equipment and evaluation of AN/ALQ-160 Acoustic Sweep. Complete design analysis of Advanced Acoustic Sweep. W0529, Airborne Minehunting System. [redacted] Conduct tests of upgraded mine neutralization devices for use in system. Start minefield RECONNaissance system design. Project W1239, Buried Mine Minehunting System. None. Project is deferred

due to higher overall Navy priorities and length of time to achieve an initial operational capability. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1981 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: (1) Project W0528, Advanced Airborne Mine Countermeasures Equipment - funding increased by 934 in FY 1981 to pay for cost growth in the AN/ALQ-166 Magnetic Sweep contract, decreased by 276 in FY 1982 to absorb a share of an undistributed Congressional reduction in research and development funding and decreased by 781 in FY 1983 due to OSD Comptroller decision to reduce FY 1983 funding with a partial restoral in FY 1984. Project cost growth of 22,612 in total estimated cost is due to deferring development of the Advanced Acoustic Sweep and the addition of a Pressure Acoustic Monitoring system as a development task under this project and additional amounts needed to complete previously assigned development tasks. (2) Project W0529, Airborne Minehunting System increased by 563 in FY 1981 to cover cost growth in the AN/AQS-17 Minehunting Sonar development contract, decreased by 94 in FY 1982 to absorb a share of an undistributed Congressional reduction in research and development funding and increased by 1,239 in FY 1983 to accelerate development of Airborne Minehunting Equipment. A project cost increase of 29,966 is anticipated due to the addition of RECONNaissance System development and Airborne Minehunting System upgrades to previous development tasks. The increase also allows completion of development and aircraft installation of the AN/AQS-17 Reacquisition Sonar and Neutralization subsystems. Project W1?39, Buried Mine Minehunting System - Funding was reduced by 2,134 in FY 1981 and 1,777 in FY 1982 to fund other mine warfare projects. Funding in FY 1983 and beyond has been deleted due to a decision to vertically cut lower priority research and development programs.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	17,495	12,975	22,782	26,113	TBD	TBD
W0528	Advanced Airborne Mine Countermeasures Equipment	12,435	8,207	13,031	13,086	23,409	102,779
W0529	Airborne Minehunting System	2,500	1,066	6,492	8,022	23,008	59,993
W1239	Buried Mine Minehunting System	2,560	3,702	3,259	5,005	TBD	TBD

Program Element: 63260N
DoD Mission Area: 234 - Mine Warfare

Title: Airborne Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Navy	11,541	17,962	16,761	25,591	105,941	177,796

Quantities: Magnetic Environmental Measuring Equipment (6); AN/ALQ-166 Lightweight Magnetic Sweep (13); AN/AQS-14 Minehunting Sonar (19); AN/AQS-17 Relocation Sonar (2); Controlled Depth/Rapid Deploy Moored Sweep (120); AN/ALQ-160 Acoustic Sweep, Advanced Acoustic Sweep, Buried Minehunting System; Neutralization Device and Reconnaissance System (to be determined).

Program Element: 63260N
DoD Mission Area: 234 - Mine Warfare

Title: Airborne Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for development of airborne mine countermeasures systems that will enable surface combatants, amphibious force ships and logistic support ships to operate with relative safety in mineable water areas in support of the Navy's sea control and projection missions. [the risk of operating mine countermeasures] In mid-1970, the Navy made a decision to make the mine countermeasures force a mix of helicopters and ships. Helicopters were originally envisioned as precursor sweepers for moored mines to provide relative safety for surface mine countermeasure ships. This is no longer the situation. The consequences of an enemy mining US and allied territorial waters, as well as sea lines of communication and choke points, could be particularly devastating to US military operations and economy. The value and effectiveness of helicopter minesweeping have been proven in Haiphong, Suez, and off the coast of Egypt. A requirement exists to expand helicopter-borne mine countermeasures from a limited capability for mechanical sweeping to include both the influence sweeping of magnetic and acoustic mines and the hunting and neutralization of exposed (proud) mines and buried bottom mines. Some interim capabilities were developed to support Vietnam requirements. [ ] a capability that is necessary to counter [ ] The projects described below are designed to provide and more effective capability to mechanically sweep moored mines, a capability to sweep coarse magnetic and acoustic mines set to attack large targets, a capability for surveying the magnetic minesweeping environment of operating areas, a capability to hunt and neutralize [ ]

(U) Project W0528, Advanced Airborne Mine Countermeasures Equipment - AN/ALQ-166 Magnetic Sweep - Will be capable of operational speeds of The continuous and pulsed current output level will more than present fleet capability and allow the sweeping of those mines set with a [ ] The increased coverage rate will reduce time required for performing magnetic minesweeping. Major system components include: turbine-generator, control unit, hydrofoil platform, sweep tail and tow/electrical/refueling cable. Magnetic Environmental Measurement Equipment - Will measure on-scene magnetic environmental parameters needed to determine optimum track spacing and effectiveness of electrode-type magnetic sweeps. AN/ALQ-160 Acoustic Sweep - Will provide [ ] Controlled Depth/Rapid Deploy Moored Sweep - Will provide a capability to increments. This system will provide a increase in operational sweeping time per sortie and reduce the number of air crewmen and crew training required. Hydrodynamic components are depth controlled to obtain maximum system flexibility and effectiveness. An added benefit is that the design will be capable of sweeping mines. Advanced Acoustic Sweep - Will provide a [ ] The device will be compatible with airborne magnetic gear, and will have a capability of producing both and will have the capability to change both

Program Element: 63260N
DoD Mission Area: 234 - Mine Warfare

Title: Airborne Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) W0529, Airborne Minehunting System - This system will provide an airborne minehunting and neutralization capability against [redacted] capability to determine the presence of mines. System performance goals for AN/AQS-14 Minehunting Sonar, AN/AQS-17 Relocation Sonar and Neutralization Device - area coverage rate [redacted] RECONNaissance Sonar - area coverage rates: [redacted] of moored mines, 3.2 sq. nmi/hr for proud bottom mines, possible capability for buried mine reconnaissance; water depth 6-60 [redacted]

(U) W1239, Buried Mine Minehunting System - This system will be used to counter mines buried in the sea bottom, [redacted]

(U) RELATED ACTIVITIES: Nonlinear parametric and synthetic aperture sonar technologies developed under Program Element 62711N, Undersea Target Surveillance Technology will be used in the developments under W1239-MW, Buried Mine Minehunting System.

(U) WORK PERFORMED BY: In-house: Naval Coastal Systems Center, Panama City, FL; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD (lead laboratories) and Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractors: EDO Corporation, College Point, NY; Westinghouse Corporation, Annapolis, MD; Sikorsky Aircraft Corporation, Stratford, CT; Bendix Corporation, Sylmar, CA; Applied Research Laboratory, University of Texas, Austin, TX; Aerojet Electrosystems, Azusa, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project W0528, Advanced Airborne Mine Countermeasures Equipment - AN/ALQ-166 Magnetic Sweep - Engineering development model contract awarded FY 1977. System assembly and component tests started. Support equipment design completed. Environmental/reliability tests started. Tow-tests of scale model conducted. Controlled Depth/Rapid Deploy Moored Sweep - Initial container sweep tests conducted and contract for evaluation gear awarded. Magnetic Environmental Measurement Equipment - Contractor selected and contract awarded. Design analysis completed and fabrication of evaluation model started. AN/ALQ-160 - development contract awarded. Design analysis completed and fabrication of evaluation models started. Project W0529, Airborne Minehunting System - AN/AQS-14 Minehunting Sonar - Follow-on test and evaluation against [redacted] AN/AQS-17 Relocation Sonar and Neutralization Device - System fabricated and in-water tests started. Project W1239, Buried Mine Minehunting System - Data base expansion continued, including investigation of neutralization concepts, bottom sediment and mine burial, [redacted]

2. (U) FY 1982 Program: Project W0528, Advanced Airborne Mine Countermeasures Equipment - AN/ALQ-166 Magnetic Sweep and Controlled Depth/Rapid Deploy Moored Sweep - environmental/reliability tests. [redacted] Magnetic Environmental Measuring Equipment and AN/ALQ-160 Acoustic Sweep - Complete fabrication and environmental/reliability tests of evaluation models. Project W0529, Airborne Minehunting System - AN/AQS-17 Relocation Sonar and

Neutralization Device Subsystem - Complete fabrication of AN/AQS-17 Reacquisition Sonar service test models and conduct environmental tests. Start aircraft installation design efforts. Project W1239, Buried Mine Minehunting System - Conduct mine burial survey on selected US ports.

3. (U) FY 1983 Planned Program: Project W0528, Advanced Airborne Mine Countermeasures Equipment - AN/ALQ-166 Magnetic Sweep and Controlled Depth/Rapid Deploy Moored Sweep - Magnetic Environmental Measuring Equipment - Conduct AN/ALQ-160 Acoustic Sweep - Complete design trade off analyses and start fabrication of evaluation models. Project W0529, Airborne Minehunting System - Select mine neutralization device for use in system. Start contractor demonstration of AN/AQS-17 Reacquisition Sonar. RECONNaissance System - Start system design and trade-offs. Project W1239, Buried Mine Minehunting System - None, funds deleted.

4. (U) FY 1984 Planned Program: Project W0528, Advanced Airborne Mine Countermeasures Equipment - AN/ALQ-166 Magnetic Sweep, Controlled Depth/Rapid Deploy Moored Sweep and Magnetic Environmental Measurement Equipment - Update documentation and evaluate change recommendations prior to production. AN/ALQ-160 Acoustic Sweep - Advanced Acoustic Sweep - complete evaluation model tests, update design-to-cost estimate, and fabricate service test model. Project W0529, Airborne Minehunting System - Complete aircraft installation of RECONNaissance - Complete detailed design and determine support requirements. Project W1239, Buried Mine Minehunting System - None.

5. (U) Program to Completion: Project W0528-MN, Advanced Airborne Mine Countermeasures Equipment - Magnetic Environmental Measuring Equipment and AN/ALQ-160 Acoustic Sweep - update documentation and evaluate change recommendations prior to production - Advanced Acoustic Sweep - technical/operational evaluation, obtain approval for service use. W0529-MN, Airborne Minehunting System - Neutralization Subsystem technical/operational evaluation. RECONNaissance System - Complete preliminary and detailed design of advanced reconnaissance sonar, technical evaluation operational evaluation and approval for service use.

6. (U) Milestones: Not applicable.

Project: W0528
Program Element: 63260N
DoD Mission Area: 234 - Mine Warfare

Title: Advanced Airborne Mine Countermeasures Equipment
Title: Airborne Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project represents development of airborne mine countermeasures systems that will enable surface combatants, amphibious force ships, and logistic support ships to operate with relative safety in mineable water areas in support of the Navy's sea control and projection missions. In 1970, the Navy made a decision to make the mine countermeasures force a mix of helicopters and ships. [, the risk of operating mine countermeasures [ ] Helicopters were originally envisioned as precursor sweepers for anti-MCM ship mines to provide relative safety for mine countermeasure ships. This is no longer the situation. The consequences of enemy mining of U.S. and allied territorial waters, as well as open sea transit lanes and choke points, could be particularly devastating to our military operations and our economy. The speed of forward deployment and effectiveness of helicopter minesweeping have been proven in Haiphong, Suez, and off the coast of Egypt and has led to a requirement to expand helicopter mine countermeasures from the early, simple capability for ; to the projects described below. These projects are designed to provide a] Systems being developed under this project are:

(1) AN/ALQ-166 - Magnetic Sweep - Will be capable of operational speed of] The continuous and pulsed current output level will more than quadruple the present fleet capability and allow sweeping The increased coverage rate [ ] will reduce time required for performing magnetic minesweeping. Major system components include: turbine-generator, control unit, hydrofoil platform, sweep tail and tow/electrical/refueling cable.

(2) Magnetic Environmental Measurement Equipment - Will measure on-scene magnetic environmental parameters needed to optimize track spacing and effectiveness of electrode-type magnetic sweeps. On-scene measurements are essential to permit optimizing of track spacing thereby minimizing the time required to sweep at maximum efficiency and ensuring system safety.

(3) Controlled Depth/Rapid Deploy Moored Sweep - Will provide a capability to automatically deploy moored sweeping equipment and to adjust sweep depths in 2-foot increments. This will provide a 25% increase in operational sweeping time per sortie and reduce both the number of air crewman and training requirements. Hydrodynamic components are depth controlled to obtain maximum system flexibility and effectiveness. An added benefit is that the design will permit sweeping of both shallow and deep moored mines [

(4) AN/ALQ-160 - Acoustic Sweep - Will provide [ ] stable towed body and increased life,]

Project: W0528
Program Element: 63260N
DoD Mission Area: 234 - Mine Warfare

Title: Advanced Airborne Mine Countermeasures Equipment
Title: Airborne Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(5) Advanced Acoustic Sweep - Will provide an operationally flexible sweep for countering acoustic mines with the device will be a compatible with airborne magnetic sweep gear, with a capability of acoustic output

(6) Pressure Acoustic Monitoring System - Will provide the capability to measure variations in water pressure to determine when influence sweep systems can be used to actuate pressure combination mines. System will also be capable of monitoring output of acoustic sweepgear to assure their proper operation.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD (lead laboratories). Contractors: EDO Corporation, College Point, NY; Sikorsky Aircraft Corporation, Stratford, CT.; Aerojet Electrosystems, Azusa, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: AN/ALQ-166 Magnetic Sweep - Procured sweep tail assembly. Started system assembly and component tests. Started design of support gear and spare part procurement. Conducted tow test of scale model. Started assembly of two complete systems and factory acceptance/environment tests. Controlled Depth/Rapid Deploy Moored Sweep - First container/sweep tests conducted. Evaluation systems contract negotiated. Initial deployment tests started. Magnetic Environmental Measurement Equipment - Contractor selected and contract awarded. Design tradeoff analysis completed.

2. (U) FY 1982 Program: AN/ALQ-166 Magnetic Sweep - Complete assembly and testing. Assemble major support and test equipment. Conduct contractor demonstration and start technical evaluation. Controlled Depth/Rapid Deploy Moored Sweep - Complete initial deployment tests and take delivery of hardware for evaluation. Conduct contractor demonstration and start technical evaluation. Magnetic Environmental Measuring Equipment and AN/ALQ-160 - Fabricate and test evaluation hardware.

3. (U) FY 1983 Planned Program: AN/ALQ-166 Magnetic Sweep and Controlled Depth/Rapid Deploy Moored Sweep - Complete technical and operational evaluations. Magnetic Environmental Measurement Equipment - Conduct contractor demonstration and technical and operational evaluations. AN/ALQ-160 Acoustic Sweep - conduct contractor demonstration and technical/operational evaluation. Advanced Acoustic Sweep - Award contract and start design tradeoffs. Pressure Acoustic Monitoring System - Select contractor and award contract.

4. (U) FY 1984 Planned Program: AN/ALQ-166 Magnetic Sweep, Controlled Depth/Rapid Deploy Moored Sweep, and Magnetic Environment Measurement Equipment - Obtain aproval for service use. Update documentation and evaluate change recommendations prior to start

of production. AN/ALQ-160 Acoustic Sweep - Conduct operational evaluation. Obtain approval for service use and update documentation. Advanced Acoustic Sweep - complete design tradeoffs and start fabrication and testing of evaluation hardware. Pressure Acoustic Monitoring System - Perform design tradeoff analysis and identify design concept.

5. (U) Program to Completion: Advanced Acoustic Sweep - Complete fabrication and testing of hardware. Conduct contractor demonstration and technical and operational evaluations. Obtain approval for service use and update documentation prior to production. Pressure Acoustic Monitoring System - Fabricate and test evaluation hardware. Conduct contractor demonstration and technical evaluations. Obtain approval for service use and update documentation.

6. (U) Milestones: Not applicable.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
W0528	Advanced Airborne Mine Countermeasures Equipment	9,141	12,755	12,305	12,433	33,711	125,391

Project: W0529 Title: Airborne Minehunting System
Program Element: 63260N Title: Airborne Mine Countermeasures
DoD Mission Area: 234 - Mine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for the development of CH-53D/E and MH-53E helicopter towed systems to [redacted] These systems used by themselves, or in conjunction with others under development in this program element and Program Element 63502N, Surface Mine Countermeasures, will enable surface combatants, amphibious force ships and logistic support ships to operate with relative safety in mineable areas in support of the Navy's sea control and power projection missions. The consequences of enemy mining of U.S. and allied territorial waters, as well as open sea transit lanes and choke points, could be particularly devastating to our military operations and our economy. [redacted]

(U) RELATED ACTIVITIES: Explosive, cable fairing and towed body technologies developed under Program Element 62734N, Countermeasures Technology, and sonar technology developed under Program Element 63502N, Surface Mine Countermeasures, Project S0260, Advanced Minehunting Sonar Systems, and Project S1404, Neutralization, will be used in the developments under Project W0529, Airborne Minehunting System.

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL (lead laboratory); Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractors: Bendix Corporation, Sylmar, CA; Sikorsky Aircraft Corporation, Stratford, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: AN/AQS-14 Detection/Classification Sonar: Completed operational evaluation and obtained approval for service use. AN/AQS-17 Relocation Sonar: Fabricated developmental test model and started initial in-water tests. Explosive: Conducted investigation of explosives for line charge configuration and selected PBXW-115 as the most stable explosive for this application.

2. (U) FY 1982 Program: AN/AQS-14 Detection/Classification Sonar: Complete documentation update for production and investigate [redacted] for increased reliability. AN/AQS-17 and neutralization device: Conduct in-water tests of sonar body. Start evaluation of [redacted] Start development of aircraft installation for neutralization subsystem. Reconnaissance: Start system design and tradeoff of body configuration.

Project: W0529 — Title: Airborne Minehunting System
Program Element: 63260N — Title: Airborne Mine Countermeasures
DoD Mission Area: 234 - Mine Warfare — Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Complete evaluation of and select a device for use in system. Start engineering development. Continue development of aircraft installation for neutralization subsystem. Conduct boat phase of AN/AQS-17 Relocation Sonar contractor demonstration. Reconnaissance: Complete detailed design and update estimates of capabilities provided. Start determination of support requirements and life cycle costs.

4. (U) FY 1984 Planned Program: AN/AQS-17 Relocation Sonar and Neutralization Device: Complete aircraft installation development and neutralization device development. Conduct aircraft compatibility tests using dummy sonar model. Reconnaissance: Start fabrication of system components for design and environmental testing.

5. (U) Program to Completion: AN/AQS-17 Relocation Sonar and Neutralization Device: Conduct airborne phase of sonar contractor demonstration and conduct technical and operational evaluations of neutralization subsystem from helicopter, Obtain approval for service use in Reconnaissance: Complete fabrication and factory tests, Conduct technical and operational evaluations

6. (U) Milestones: Not applicable.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0529	Airborne Minehunting System	1,629	6,398	9,261	12,471	38,795	89,959

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63261N
Title: Tactical Air Reconnaissance
DoD Mission Area: 323 - TIARA for Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,553	5,019	5,670	2,669	Continuing	Continuing
W0534	Tactical Reconnaissance System	3,553	5,019	5,670	2,669	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Design and develop a cost effective means for obtaining tactical air reconnaissance data by use of sensor configured reconnaissance pods to be integrated with F-14 carrier-based aircraft. These [redacted] interim pods (with optical and infrared sensors) have replaced the RA-5C and RF-8G reconnaissance systems. A total of 48 pods is being procured for fleet use. A follow-on system is necessary to provide tactical intelligence in all weather conditions from a standoff distance beyond surface weapon threat envelopes. The follow-on system for the 1990's, the RF-X, will incorporate a data link, which will transmit [redacted] in near real time to the carrier. To improve aircraft survivability, [redacted] sensors, will be adapted for the pod and be transferable to the follow-on system.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Conduct flight tests of [redacted] sensor [redacted] for incorporation into the pod to improve aircraft survivability. Modify an aircraft as an Engineering Test Bed, for testing and evaluating systems in the flight environment. Initiate multi-platform capable long range, high resolution radar, and definition of the ground exploitation system and the ship terminal interface. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: The reduction of -$693 in FY 1981 results from the congressional reduction, and Navy reprogramming to reduce scope of prototype effort when full program decision was not reached in that year. The reduction of -$1089 in FY 1982 results from Defense Department programmatic decisions. The increase of $2,183 in FY 1983 is to accelerate the advanced development program effort preparatory to Full Scale Development of a new Tactical Air Reconnaissance aircraft.

Program Element: 63261N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Air Reconnaissance
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,083	4,246	6,108	3,487	Continuing	Continuing
W0534	Tactical Reconnaissance System	3,083	4,246	6,108	3,487	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN [ ] Pods)	17,690	3,137	4,887	4,057	Continuing	Continuing
Quantities (Delivered)	(7)	(24)	(17)	0		

Program Element: 63261N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Air Reconnaissance
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Fleet mobility, unpredictable target weather and location, the need for real-time intelligence and the requirement for a variety of sensor intelligence to support tactical delivery of the Navy's new weapons, substantiates a continued need for a self-contained optical, [ ] capability aboard the aircraft carrier. The purpose of this project is to design and develop a cost effective means for obtaining this tactical information for the Battle Group commander. This program has developed a [ ] Tactical Air Reconnaissance Pod System (TARPS), which has been integrated with the F-14 aircraft. The resulting reconnaissance capability is an interim response to the phase-out of the previous Navy reconnaissance systems (RA-5C and RF-8G), until such time as a follow-on Tactical Reconnaissance System is available. The follow-on system will be compatible with the Navy carrier-based supersonic aircraft deployed during the 1980's and 1990's. To improve aircraft survivability, a [ ] sensor, will be adapted for the pod and will be transferable to the follow-on system.

(U) RELATED ACTIVITIES: The U.S. Marine Corps is presently modifying 28 RF-4B aircraft during Service Life Extension Program to incorporate the UPD-4 Synthetic Aperture Radar and the AAD-5 Infrared Reconnaissance Set to provide additional intelligence gathering capability. The Air Force has developed the Advanced Building Block Large Area Exploitation (ABLE) real time ground system for processing data-linked APD-10 data. The Navy is developing the Inverse Synthetic Aperture Radar (ISAR) technology for classifying ships at sea.

(U) WORK PERFORMED BY: In-house: Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN. Contractors: Fairchild Weston Systems Co., Syosset, Long Island, NY; Fairchild Space and Electronics Co., Germantown, MD; Honeywell Radiation Center, Lexington, MA; Grumman Aerospace Inc., Bethpage, Long Island, NY; McDonnell Aircraft Co., St. Louis, MO; Goodyear Aerospace Co., Litchfield Park, AR.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Program planning initiated in 1974. A reconnaissance pod containing sensors [ ] has been developed for the F-14 (Tactical Air Reconnaissance Pod System - TARPS). Limited production of TARPS initiated in December of 1979. Engineering Development Models (EDMs) are being utilized in fleet training. Initial fleet deployment was on USS NIMITZ in August 1981. Both Hughes Aircraft Co. and McDonnell Aircraft Co. have examined the potential for exploiting technology advances to permit employment of the F/A-18 AN/APG-65 radar in the reconnaissance role. McDonnell Douglas Aircraft Co. has defined modifications to the F/A-18 that will permit its employment as a multi-mission reconnaissance aircraft. USN participated in USAF field exercises of data-linked systems for ground exploitation of the real-time imagery.

Program Element: 63261N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Tactical Air Reconnaissance
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue to produce and deploy the Tactical Air Reconnaissance Pod System (TARPS) pods. Conduct selection, test and evaluation of available [sensors]. Initiate engineering adaptation of selected pod equipment for production. Define the sensor-aircraft interface. Support Navy/Marine Corps follow-on tactical reconnaissance platform decision with initial program design efforts for a reconnaissance variant of the F/A-18 aircraft.

3. (U) FY 1983 Planned Program: Continue to produce and deploy the Tactical Air Reconnaissance Pod System (TARPS) pods. Flight test [ ] sensor and [ ] aircraft for sensor evaluation in the flight environment. Initiate definition of characteristics for a multi-platform capable long range, high resolution radar, ground exploitation system and ship terminal interface.

4. (U) FY 1984 Planned Program: Procure and deploy [ ] sensors [ ] for incorporation into the Tactical Air Reconnaissance Pod System (TARPS). Procure prototype long range, high resolution radar which can be considered for multi-Service use on future tactical platforms. Test and evaluate optical, [ ] systems in test bed aircraft.

5. (U) Program to Completion: Complete development of the follow-on reconnaissance system. Prepare carriers to receive, interpret and employ real-time tactical intelligence. Produce and deploy the follow-on systems. This is a continuing program.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63262N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Survivability and Vulnerability
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,399	8,015	10,864	16,471	Continuing	Continuing
W0591	Aircraft Survivability and Vulnerability	1,953	2,569	2,927	6,421	Continuing	Continuing
W0592	Aircraft and Ordnance Safety	2,206*	2,717	3,270	3,417	Continuing	Continuing
W1088	Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS)	2,022	2,364	3,563	3,607	Continuing	Continuing
W1277	Aircraft Nuclear Survivability	1,218	365	1,104	3,026	2,253	7,966

* Project W0592 was funded in PE 63514N (Shipboard Damage Control) in FY 1981 and prior years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: High aircraft and air crew loss rates in the Southeast Asia and Middle East wars clearly demonstrated the vulnerability of U.S. aircraft weapons systems to conventional threats. Vulnerability to chemical, biological, radiological, and high energy threats have not been so dramatically demonstrated, but lack of emphasis in acquisition processes may make chemical, biological and radiological threats inevitable. This program also examines electromagnetic pulse effects on aeronautical weapons systems and methods of selecting and designing balanced suites of electromagnetic pulse vulnerability reduction features. The program also evaluates fire problems related to aircraft and ordnance in shipboard fires.

(U) BASIS FOR FY 1983 RDT&E REQUEST: W0591, Aircraft Survivability and Vulnerability: With priority to Navy and United States Marine Corps unique requirements, this project will address flight controls, signature reduction, fuel tank improvement, propulsion systems and survivability/vulnerability performance trade-offs. W0592, Aircraft and Ordnance Safety: Evaluates fire response characteristics of aircraft structures and ordnance to develop retrofits and advanced design concepts to reduce the associated hazards. W1088, Joint Technical Coordinating Group on Aircraft Survivability: Will accomplish projects related to tri-service needs as determined by the Joint Technical Coordinating Group on Aircraft Survivability Central Office and approved by the Joint Logistics Commanders. W1277, Aircraft Nuclear Survivability: Will define the vulnerability of selected Naval tactical aircraft to nuclear electromagnetic pulse and will develop means for determining the nuclear electromagnetic pulse vulnerability

Program Element: 63262N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Survivability and Vulnerability
Budget Activity: 4 - Tactical Programs

of other tactical aircraft. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only. For Project W1277, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary consists of the following: FY 1981 decrease of 182 in W0591, W0592 and W1277 is due to general reduction for inflation and travel; with an increase of 209 in W1088 due to refinement of cost estimates for an overall increase of 27 in FY 1981. FY 1982 is reduced 2,955 overall due to a Congressional cut in W1277 of 1,000; the remaining reduction of 1,955 is due to early application of directed FY 1983 cuts in contractor support services and management costs. FY 1983 decreased overall by 1,446; with reductions in W0591, W0592 and W1088 totaling 2,314 due to cuts in contractor support services and management costs, and an increase in W1277 of 868 to fund testing of an F/A-18 aircraft. W1277 total estimated cost increased 4,977 due to program delays in completing testing of A-7 and F-14 aircraft and the addition of the F/A-18 testing.

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,016	7,372	10,970	12,310	Continuing	Continuing
W0571	Helicopter Survivability and Vulnerability	631	0	0	0	0	1,911
W0591	Aircraft Survivability and Vulnerability	2,873	2,071	3,567	5,144	Continuing	Continuing
W0592	Aircraft and Ordnance Safety	1,512*	2,229*	3,209	3,427	Continuing	Continuing
W1088	Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS)	**	1,813	2,700	3,503	Continuing	Continuing
W1277	Aircraft Nuclear Survivability	0	1,259	1,494	236	0	2,989

* W0592 in PE 63514N (Shipboard Damage Control) in FY 1981 and prior.

** The Joint Technical Coordinating Group on Aircraft Survivability was funded in W0591 in FY 1980.

(U) OTHER APPROPRIATIONS: Not applicable.

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DEPARTMENT OF THE NAVY SUPPORTING DATA FOR FISCAL YEAR 1983 BUD--ETC(U)
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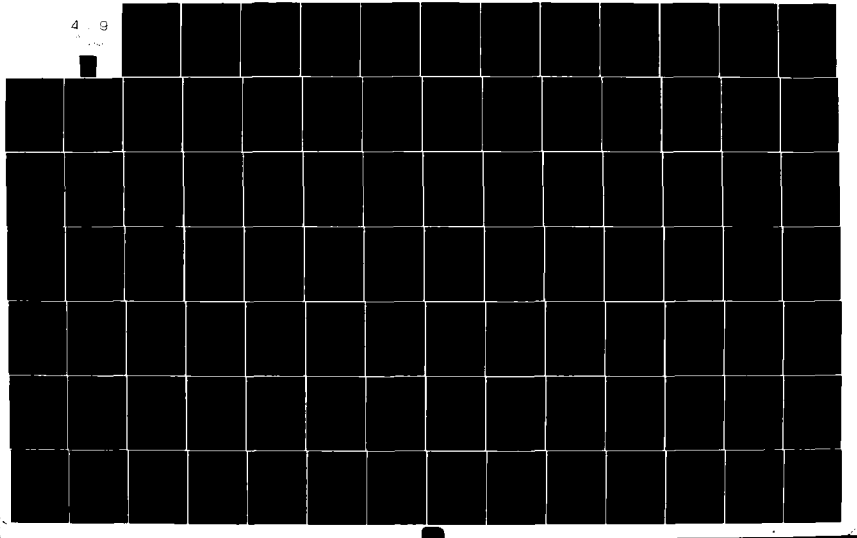

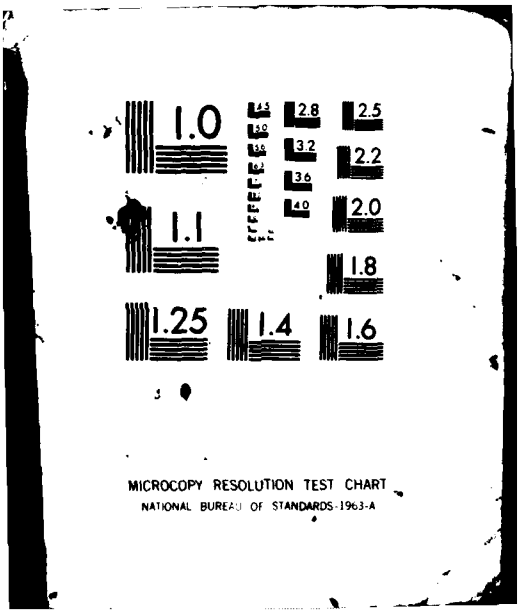
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Program Element: 63262N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Survivability and Vulnerability
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program was initiated as a result of the high loss-rates of aircraft and helicopters during the Southeast Asia War and the two Mideast Wars. The design of aircraft and helicopters had failed to properly account for the newer threat environment in which they had to operate and they were found to be vulnerable to many types of enemy weapons. This program provides the means to enhance combat effectiveness by increasing the levels of survivability and by utilizing combat and engineering test data to advance the state of the art by ensuring that future design standards and specifications properly reflect survivability requirements which will be incorporated in system and component designs. W0591 Aircraft Survivability and Vulnerability: Supports efforts to solve problems associated with Navy and Marine aircraft. Efforts include development of lightweight components having resistance or tolerance to ballistic and other threats, lightweight fire and explosion suppression techniques and the enhancement of capability to evaluate survivability of aircraft. W0592, Aircraft and Ordnance Safety: This project focuses on aircraft combat survivability, aircraft ordnance "cook-off" and aircraft response to deck/hanger bay fires. This effort will include the identification and improvement of aircraft flammable structures (composites), metal fires, and hazardous aircraft subsystems (liquid oxygen, coolant, etc.). W1088, Joint Technical Coordinating Group on Aircraft Survivability: Funds the Navy support of the Joint Technical Coordinating Group on Aircraft Survivability, a Tri-Service group under the Joint Logistic Commanders of the Army, Air Force and Navy that is chartered to: coordinate Service research and development in aircraft systems survivability/vulnerability for nonnuclear threats; initiate and pursue Joint Army/Navy/USAF survivability/vulnerability research and development efforts; ensure survivability/vulnerability research and development data and criteria is available to aircraft developers; develop Tri-Service standards for design integration methodology, testing, and specifications for survivability/vulnerability. W1277, Aircraft Nuclear Survivability is a joint Navy/Defense Nuclear Agency project entitled Fleet Aircraft Assessment - Naval Test and Analysis for Electromagnetic Pulse Limitations which was initiated in FY 1979 under Defense Nuclear Agency funding with the objectives of: (1) testing selected Naval tactical aircraft to measure the vulnerability of their electronics systems to the damaging and interfering effects of nuclear electromagnetic pulse and (2) concurrently developing cost effective technological means of assessing the electromagnetic pulse vulnerability of other tactical aircraft.

(U) RELATED ACTIVITIES: Liaison is maintained with the Joint Technical Coordinating Group on Munitions Effectiveness, with other Services System Commands, with the Defense Nuclear Agency and, to some degree, NATO, on survivability related programs.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA.; Naval Air Development Center, Warminster, PA.; Naval Air Propulsion Center, Trenton, NJ; Naval Weapons Support Center, Crane, IN; Naval Air Engineering Center, Lakehurst, NJ; Naval Postgraduate School, Monterey, CA; Naval Surface Weapons Center, Silver Spring, MD; Naval Weapons Evaluation Facility, Albuquerque, NM; and Army and Air Force laboratories. Contractors: SCIENAR Inc, Buffalo, NY; ORI, Inc., Washington, DC; Dayton T. Brown, Bohemia, NY and others.

Program Element: 63262N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Survivability and Vulnerability
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0591, Aircraft Survivability and Vulnerability: Efforts have included: development of an effective means of preventing onboard aircraft fire/explosion by solid ballistic foam, reticulated foam in fuel tanks and bottled fire inhibiting compounds; an evaluation of the feasibility of a lightweight onboard nitrogen generator capable of inerting the fuel tanks; initiation of a program to develop a prototype onboard nitrogen generator; development of a low diameter self sealing fuel line; investigations of the techniques available for reducing the radar reflectivity of fixed-wing aircraft; initiation of a program to develop a ballistically tolerant/jam resistant actuator effective against larger threats; determined optimum camouflage schemes (Tactical Paint Schemes) for F-4, A-4, A-6, A-7, F-14, P-3, F-8, AV-8 and F/A-18; developed MIL-STID-2072(AS) "Establishment and Conduct of Programs for Aircraft Survivability" and established survivability programs for aircraft. W0592, Aircraft and Ordnance Safety: Methods of increasing air launched weapon resistance to "cook-off" were developed for the MK-80 series bombs, cluster weapons, unguided rockets and the Shrike missile warhead. Established standardized test methods and criteria for air launched missile coatings. Evaluated heat path elimination concepts for several weapons. Developed sheet wrap intumescent coating for missile warheads. Evaluated concepts to reduce booster initiated warhead detonations during cook-off. Developed specifications which establish requirements for cook-off characteristics of future air launched weapon systems. Tested and proved shipboard firefighting procedures for new aircraft which incorporate advanced composite structures (F-18, AV-8B). Identified highly effective agent for extinguishing jet engine titanium metal fires. Developed computer code to predict time to failure for aircraft composite structures exposed to inflight fires. Completed thermal analysis of in-service composite materials. Analysis of advanced composite materials begun. Improved protective coatings. Investigated extinguishment methods for composites which reduce fibre release hazards. Developed specifications and standards which improve "cook-off" characteristics for advanced ordnance design. Improved missile motor "cook-off" characteristics. Identified methods to characterize, detect and combat titanium-fed fires. W1088, Joint Technical Coordinating Group on Aircraft Survivability: This project provides the Navy's support to the Joint Technical Coordinating Group on Aircraft Survivability. Tri-Service unique activities included standardization of survivability/vulnerability testing procedures, improvement of test facility capabilities, standardization of evaluation methodologies and computer models and information dissemination to the DOD/Industrial Community of these results. W1277, Aircraft Nuclear Survivability: Project initiated in FY 1979 with planning and coordination followed by analysis of A-7E aircraft electronics to define components potentially vulnerable to the effects of nuclear electromagnetic pulse in FY 1980. Full Scale electromagnetic pulse threat simulation tests were completed on A-7E test bed aircraft. Initiated assessment coordination for F/A-18 and F-14A aircraft. F-14A selected for FY 1981 testing due to nonavailability of F/A-18 test bed aircraft. Full scale electromagnetic pulse threat simulation tests were initiated on F-14A test bed aircraft.

2. (U) FY 1982 Program: W0591, Aircraft Survivability and Vulnerability: Complete design of prototype jam-proof flight control actuator and determine feasibility; continue the development of optimum camouflage and paint schemes for remaining Navy/Marine Corps aircraft. Complete development of prototype onboard nitrogen generator and conduct testing to evaluate performance;

continue development of requirements for chemical, biological and radiation protection for aircraft and aircrews. Initiated the development of battle damage repair evaluation methods; W0592, Aircraft and Ordnance Safety: Complete development of thermal protection for Sparrow warheads and Shrike and Sparrow rocket motors. Continue development of thermal protection methods for Sidewinder, Walleye and Standard ARM. Develop concepts to prevent cook-off detonations of mechanical bomb fuzes. W1088, Joint Technical Coordinating Group on Aircraft Survivability: Standardize infrared signature measurement procedures and reporting requirements. Establish a Tri-Service repository for standard survivability evaluation computer models for government and contractor use. Continue the coordination of the tri-service survivability programs to avoid duplication and to maximize the value of Research and Development expenditures. W1277, Aircraft Nuclear Survivability: Continue to refine electromagnetic pulse assessment methods. Complete F-14A electromagnetic pulse tests and define F-14A electromagnetic pulse vulnerability. Initiate pretest analysis of F/A-18 vulnerability to electromagnetic pulse effects.

3. (U) FY 1983 Planned Program: W0591, Aircraft Survivability and Vulnerability: Continue to develop low infrared reflective coatings for the Anti-Submarine Warfare aircraft and helicopters. Continue work on survivable propulsion system design features; develop reduced radar cross section and infrared signature reduction design criteria for advanced engines; commence missile survivability efforts; determine structural and component response to high energy weapons; incorporate advancements into trade-off models; design handbooks and military specifications and standards. W0592, Aircraft and Ordnance Safety: Complete thermal protection systems for Sidewinder missile and Standard ARM rocket motor. Complete development of cook-off resistant boosters for Sidewinder, Sparrow and Standard ARM warheads. Continue development of protection devices for advanced rocket motors. Determine thermal response of advanced composite materials. Publish, in firefighting manuals, the cooling requirements for weapons which have been involved in accidental fuel fires, the firefighting methods/agents for extinguishing aircraft metal combustion, and toxicity levels during various fire scenarios. W1088, Joint Technical Coordinating Group on Aircraft Survivability: Continue tasks not completed in FY 1982. Develop life-cycle cost models for survivable propulsion systems. Initiate development of multi-aircraft engagement models for surface-to-air missile threats. Expand effort to identify necessary threat information and task Service intelligence organizations, through Defense Intelligence Agency to collect and provide data. Continue to publish and upgrade survivability design standards. W1277, Aircraft Nuclear Survivability: Document the electromagnetic pulse assessment methods developed during the project and define the tactical aircraft design requirements necessary to ensure the survivability of tactical aircraft to the effects of nuclear electromagnetic pulse. Define F-14A electromagnetic pulse hardening design options and costs. Initial full scale electromagnetic pulse testing of F/A-18 aircraft. Initiate pretest analysis of E-2C aircraft.

4. (U) FY 1984 Planned Program: W0591, Aircraft Survivability and Vulnerability: Continue to develop design criteria/[illegible]sure for aircraft propulsion systems having tolerance to ballistic threats and fuel ingestion. Continue to reduce infrared [illegible]re of aircraft through innovative exhaust design and advanced lightweight components. Reduce vulnerability of aircraft [illegible] high energy threats. Commence development of techniques to provide chemical, biological, and radiation protection/decontamination capability for aircraft and helicopters. Commence development of survivability criteria and fe[illegible] for air-launched missiles. Continue effort on producing battle damage repairability methods, technology and repair kits.

Program Element: 63262N
DoD Mission Area: 238 - Other Naval Warfare

Title: Aircraft Survivability and Vulnerability
Budget Activity: 4 - Tactical Programs

W0592, Aircraft and Ordnance Safety: Develop thermal protection of air launched mines and torpedos. Develop methods to eliminate cook-off induced detonation reactions of unguided rockets and cluster bomblets. Continue development of technology which, when applied to ordnance in development, will eliminate the need for retrofit thermal protection. Develop methods to reduce the violence of aircraft subsystems response to fires. W1088, Joint Technical Coordinating Group on Aircraft Survivability. Continue tasks not completed in FY 1983. Conduct a surface-to-air missile model trade study. Develop protection for fuel system components against hydraulic ram effects. Conduct survivability tests on newly developed advanced composite materials. Conduct a performance evaluation of High Energy Laser protective coating system for graphite/epox composites. Conduct a turbine engine infrared/radar cross section signature demonstration. Update engine damage models. Initiate durability-survivability research. W1277, Aircraft Nuclear Survivability: Initiate full scale electromagnetic pulse testing on E-2C aircraft. Complete post test analysis of F/A-[illegible] vulnerability and define electromagnetic pulse hardening design options.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63267N
DOD Mission Area: 34 - Tactical Command and Control

Title: Combat Identification System
Budget Activity: 4 - Tactical Programs

RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,500	2,488	6,694	6,669	Continuing	Continuing
W1253	Combat Identification System	2,500	2,488	6,694	6,669	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This project is a Tri-service program, USAF lead, to develop a common advanced Identification Friend, Foe or Neutral system. The Navy has the only in-house laboratory capability of the three services and is, therefore, a key participant. Promising new identification techniques will be investigated and unique Navy requirements for aircraft, ships and submarines will be determined. This project funds the Navy portion of the new cooperative identification system and is provided to the Air Force for execution.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development. Expand operational analysis studies. Provide funding to Air Force for new cooperative identification system development. The increase in funding of $4,206 thousand from FY 1982 to FY 1983 is caused by acceleration of the program due to high level NATO/OSD interest. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are an increase of $2,500 (FY 1981) approved by Congress to support FY 1981 Navy involvement in this program; minus $33 (FY 1982) because of routine budget adjustments and minus $206 (1983) due to revised inflation estimates.

Program Element: 63267N
DOD Mission Area: 344 - Tactical Command and Control

Title: Combat Identification System
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	2,521	6,900	Continuing	Continuing
W1253	NATO Future Identification System	0	0	2,521	6,900	Continuing	Continuing

(U) *OTHER APPROPRIATIONS FUNDS:* Not Applicable.

Program Element: 63267N
DOD Mission Area: 344 - Tactical Command and Control

Title: Combat Identification System
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The present identification systems in use are not uniform [redacted] The classical means of identifying friendly aircraft beyond visual range has been the radar based system. A coded signal is transmitted which triggers a transponder on the friendly aircraft which transmits a coded signal back to the interrogator for identification. These systems [redacted] A new identification system is needed which is compatible with NATO and US Services' equipment and requirements. The Central European scenario is of primary interest, however, the Navy's future possible engagement scenarios are more diverse in environment than the central front. Peripheral scenarios such as the North Sea, Mediterranean, and Atlantic will require major Navy involvement while the Central front will be the primary concern of the Army and Air Force with Navy support. This program element provides Department of the Navy funding to a tri-service effort to ensure that unique Navy requirements are met. The US Army and Air Force have requirements for ground and airborne identification systems. Navy Requirements cover aircraft, ships, submarines and amphibious forces which operate in unique scenarios and, therefore, require special attention.

(U) RELATED ACTIVITIES: An exploratory development program under PE 62712N, Surface/Aerospace Target Surveillance Technology, to explore identification techniques other than transponders has been initiated. Support for identification of non-cooperative targets will be provided by efforts under PE 63515N, Advanced Identification Techniques. Navy shipboard technical inputs for the development of a new identification system is being provided under P.E. 64211N, MK XII Identification Friend or Foe.

(U) WORK PERFORMED BY: In-House: Naval Air Systems Command, Washington, D.C., will be the manager of this effort and will coordinate with Naval Sea Systems Command and Naval Electronics Systems Command. Navy laboratories that are participating are Naval Research Laboratory, Washington, D.C., Naval Ocean Systems Centers, San Diego, CA, and Naval Avionics Center, Indianapolis, IN. Contractor: Hazeltine, Greenlawn, NY, Bendix, Baltimore, MD, E-Systems, Warminster, PA, Logicon, San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program was started in FY 1981. Previous funding support has been provided from Program Element 62712N, Surface/Aerospace Target Surveillance Technology, and Program Element 63515N, Advanced Identification Techniques.

2. (U) FY 1982 Program: In conjunction with Air Force Lincoln Laboratory, support development of identification efforts [redacted] Support studies of four unique Navy-oriented scenarios to assess compatibility of proposed system requirements with Navy operational methods. Develop critical hardware and demonstrate in the laboratory. Use the results of the electromagnetic support measures integration studies to write a specification for critical hardware items and initiate procurement of this hardware. Provide guidance and funding to Air Force for a new cooperative, NATO compatible Identification, Friend or Foe system.

Program Element: 63267N
DOD Mission Area: 344 - Tactical Command and Control

Title: Combat Identification System
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Develop [ ] Test in the laboratory and in a simulated dense target environment. Continue operational analysis of emerging identification concepts to assess their potential adequacy. Build breadboard models of the most promising systems; test in the laboratory and in the Identification, Friend or Foe simulator. Test and evaluate contractor proposed hardware and concepts at Navy laboratories. Provide funds to Air Force. The increase in funding of $4,206 thousand from FY 1982 to FY 1983 is caused by acceleration of the program due to high level NATO/OSD interest.

4. (U) FY 1984 Planned Program: Under Air Force lead, fabricate Advanced Development Models of systems which show the most promise. Test the Advanced Development Models and use the resulting test and engineering data to write an engineering development specification. While individual equipment in this area of development will complete advanced development and transition to engineering development, the overall program will continue to develop new equipment or modify existing equipment as required.

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

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63313N
Title: Imaging Infrared Maverick
DoD Mission Area: 223 - Close Air Support and Interdiction
Budget Activity: 4-Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,473	9,508	4,992	2,075	14,270	TBD
W0302	Imaging Infrared Maverick	0*	0**	4,992	2,075	14,270	24,367***
	Quantity				(OT&E)		(8)
W0874	Laser Maverick	4,473	1,000	0	0	TBD	TBD
	Quantity		(OT&E)		(OT&E)		(27)
W1415	Hellfire	0	8,508	0****	0	0	8,508

*6,700 provided to USAF Maverick program (PE 64608F) *** Excludes 23,100 provided to USAF for Navy unique requirements.
10,400 provided to USAF Maverick program (PE 64608F) ** Funding transferred to PE 64371N after FY 1982.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Imaging Infrared Maverick and Laser Maverick provide the Navy and Marine Corps with precision guided short range, line of sight, day-night missiles for close air support, interdiction and strike missions against land and sea targets to capitalize on the standoff targeting offered by aircraft Forward Looking Infrared and Angle Rate Bombing System acquisition systems thus improving aircraft survivability in the high threat terminal defense environment. The Hellfire missile will significantly enhance the anti-armor capability of Marine Corps attack helicopters and increase survivability with the addition of laser homing, fire-and-forget weapon.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Imaging Infrared Maverick: Complete integration of launch and control system into the A-7E aircraft. Complete Development Test and Evaluation. Complete technical preparation for Operational Test and Evaluation. Complete development of Integrated Logistics Support Package for Operational Test and Evaluation. Conduct Operational Test and Evaluation. Hellfire Missile: Continue modifications required to make the missile shipboard compatible under PE 64371N, Hellfire. Procure Developmental Test and Evaluation and Operational Evaluation Hardware. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The change between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: FY 1982; Imaging Infrared Maverick was reduced to zero from 11,084 and 10,400 was added to the USAF Maverick program to support Navy unique requirements. Laser Maverick was increased from zero to 1,000 to continue development and correct deficiencies prior to operational evaluation. Helifire

Program Element: 63313N Title: Imaging Infrared Maverick
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4-Tactical Programs

decreased $92 for inflation adjustment. FY 1983, Imaging Infrared Maverick changed from TBD to $4,992 based on development/operational testing estimates. Total estimated cost: Imaging Infrared Maverick changed from TBD to $24,367 due to development efforts associated with larger, detachable wings/fins and an improved rocket motor for increased performance and storage density.

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,000	4,473	19,684	TBD	TBD	TBD
W0302	Imaging Infrared Maverick	0	0	11,084	TBD	TBD	TBD
W0874	Laser Maverick	1,000	4,473	0	TBD	TBD	TBD
W1415	Hellfire	0	0	8,600	TBD	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional* to Completion	Total Estimated Cost
WPN Laser Maverick	0	5,000	32,200	47,000	TBD	TBD
(Quantity)	(0)	(0)	(90)	(350)	TBD	TBD
APN A-4 Aircraft	0	0	4,500	TBD	TBD	TBD
(Aircraft/Launcher Quantity)	(0)	(0)	(22/50)	TBD	TBD	TBD
WPN Imaging Infrared Maverick	0	0	0	33,000	792,000	825,000
(Quantity)	(0)	(0)	(0)	(180)	(580)	(760)
APN A-7 Aircraft	0	1,900	0	0	TBD	TBD
(Quantity)	(0)	(2)	(0)	(0)	TBD	TBD
APN A-6 Aircraft Integration	0	0	0	0	TBD	TBD
WPN Hellfire			18,700	19,700	88,000	TBD
(Quantity)			(195)	(227)	(1460)	TBD
APN AH-1 Aircraft			10,500	50,700	TBD	TBD
(Quantity)			(0)	(0)	TBD	TBD

* Through FY 1987

Program Element: 63313N | Title: Imaging Infrared Maverick
DoD Mission Area: 223-Close Air Support and Interdiction | Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: W0302, Imaging Infrared Maverick: Will integrate existing missile components to provide the Navy with a Forward-Looking Infrared compatible, short-range direct-fire missile. It will be used with the A-6E Target Recognition Attack Multi-sensor, F/A-18 and A-7E Forward-Looking Infrared, and A-4M and AV-8B Angle Rate Bombing System equipped aircraft. The Imaging Infrared Maverick will fill the need for a complementary, moderate cost system that will capitalize on the standoff that these acquisition systems offer. It will utilize modifications to the USAF Imaging Infrared Maverick including the Laser Maverick 300 pound alternate warhead and out-of-line igniter. This weapon will give the Navy/Marine Corps a first pass, day/night, low altitude delivery capability for the sea control and interdiction missions. The Infrared Imaging Maverick with the 300 pound warhead will provide wide target spectrum coverage for interdiction and close air support missions. W0874, Laser Maverick - Consists of a semi-active laser seeker, a 300 pound penetrating blast/fragmentation warhead with cockpit selectable fuze, and a Maverick rocket motor with an out-of-line ignition device to satisfy shipboard safety requirements. The warhead, fuze, motor and launcher are common with the Imaging Infrared Maverick. It will fill a long-standing Marine Corps requirement for close air support missions and battlefield interdiction. W1415, Hellfire - The safety and shipboard compatibility problems unique to Navy/Marine Corps employment must be resolved and the missile integrated aboard the AH-1J/T aircraft. This U.S. Army development missile will provide a laser homing, fire-and-forget capabilty against enemy armor currently lacking on Marine Corps attack helicopters.

(U) RELATED ACTIVITIES: Imaging Infrared Maverick/Laser Maverick: The Air Force has been designated lead development service with the Navy and Marine Corps assigned as participating services. USAF PE 64608F (Close Air Support Weapons System). Hellfire: The U.S. Army is lead development service for the missile which is the primary weapon system for the Army Advanced Attack Helicopter. PE 64310A, Project 074; Heliborne Missile - Hellfire.

(U) WORK PERFORMED BY: Imaging Infrared Maverick: In-House: Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, IN. Contractors: Hughes Aircraft Co., Canoga Park, CA. Hellfire: In-House: Naval Weapons Center, China lake, CA. Contractors: Rockwell International, Columbus, OH.

PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0302: Monitored Air Force effort. Developed unique Navy/Marine Corps Test and Evaluation requirements. Defined Navy Imaging Infrared Maverick specification. Funded Navy share of out-of-line igniter for reduced smoke rocket motor. W0874: Procured Laser Maverick Operational Test and Evaluation hardware. Completed launcher development test; certified A4M aircraft Maverick system; complete logistic publications and initiated Navy Logistic Support Agreement. Complete sixteen Development Test and Evaluation missile launches.

2. (U) FY 1982 Program: Imaging Infrared Maverick: Complete Developmental Test and Evaluation flight test program. Continue ship tracking software development. Procure Operational Test hardware. Laser Maverick: Complete shipboard compatibility

development efforts. Conduct Initial Operational Test and Evaluation with 15 missiles. Obtain Provisional Approval for Service Use. Award long lead production contract. Hellfire: Initiate development of arm and fire device for the rocket motor. Conduct electromagnetic interference testing and make necessary modifications for shipboard compatibility. Initiate helicopter integration and retrofit program.

3. (U) FY 1983 Planned Program: Imaging Infrared Maverick: Conduct Operational Test and Evaluation. Initiate integration on A-6E aircraft. Laser Maverick: Not applicable. Hellfire: FY 1983 and subsequent will be reported under PE 64371N, Hellfire.

4. (U) FY 1984 Planned Program: Imaging Infrared Maverick: Continue A-6E integration. Initiate effort on larger detachable wings and rocket motor improvements for increased range, low level launch capability and shipboard storage density.

5. (U) Program to Completion: Imaging Infrared Maverick: Complete effort on larger detachable wings and rocket motor improvements for increased range, low level launch capability and shipboard storage denisty.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

m Element: 63318N
ssion Area: 231 - Anti-Air Warfare

Title: Army/Navy Surface-to-Air Missile (SAM) Technology
Budget Activity: 4 - Tactical Programs

SOURCES (PROJECT LISTING): (Dollars in Thousands)

t Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	5,216	13,218*	14,169	12,843	Continuing	Continuing
Army/Navy Surface-to-Air Missile Technology	5,216	13,218*	14,169	12,843	Continuing	Continuing

ctual amount funded will be $12,000. $1,218 was erroneously placed in this project and has been transferred to 64221N, P-3 ization program.

I - DESCRIPTION OF ELEMENT AND MISSION NEED: This program sponsors projects which develop technology for Army, Navy, and Corps surface-to-air, area defense missile systems. The projects are not system acquisitions. They are advanced yping hardware demonstrations, as opposed to studies, to prove the military feasibility of technology and its potential for sing anti-air warfare capability. Project outputs are recommendations for new subsystem inclusions in major system pments, including, where appropriate, recommended use of common subsystems by Army, Navy, and Marine Corps. The only t project is the Multimode Guidance Project. Its purpose is to demonstrate area defense and long-range missile guidance e of causing destruction of air targets in multi-target, heavy countermeasures environments.

ASIS FOR FY 1983 RDT&E REQUEST: Two independent multimode guidance contractors will complete risk reduction tests on ents and subsystems of their designs. Guidance system autonomy and operating immunity to countermeasures will get design is. The contractors will start fabrication of brassboard multimode guidance units for later field tests and captive flight trations. Government and contractor test and evaluation planning for these later tests will be done, and special test ent will be built. The above funding includes outyear escalation and encompasses all work or development phases now planned icipated through FY 1984 only.

MPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY Descriptive Summary and that shown in this Descriptive Summary are as follows: The program FY 1981 budget went entirely to t the Multimode Guidance Project. The increase in FY 1981 from $3,352 to $5,216 reflects $1,864 reprogrammed into the m element to speed development of multimode guidance technology and hasten the receipt of test data to confirm that area e missile guidance can engage enemy missiles and aircraft under continually increasing levels of electronic countermeasures

and coordinated Multi-Target attack. The decrease in FY 1982 from $13,568 to $12,000 resulted from a $1,568 Congressional reduction. Funding is now reflected in the FY 1983 estimate due to a more firmly structured program.

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,182	3,352	13,568	TBD	Continuing	Continuing
S0186	Area Surface-to-Air Missile Technology	3,182	3,352	13,568	TBD	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 63318N
DOD Mission Area: 231 - Anti-Air Warfare

Title: Army/Navy Surface-to-Air Missile (SAM) Technology
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program was established by DoD in 1977. It conducts projects to develop, for potential common use by Army, Navy, and Marine Corps, technology for improving surface-to-air, area defense missile systems. The projects carry out advanced prototyping hardware tests which produce data to show that new technology is feasible and will strongly improve anti-air missile system capabilities. The program's current project is the Multimode Guidance Project. It's purpose is to produce and test brassboard multimode guidance units to show a tactical capability to destroy enemy missiles and aircraft attacking U.S. surface foces in multi-target, heavy electronic countermeasures situations. The project output will be data necessary to answer serious Anti-air Warfare issues: optimum mix of air-launched/surface-launched missile systems; optimum tactics for coordinating area defense and outer-perimeter defense layers in overall Navy Anti-air Warfare; minimum performance requirements for long-range targeting systems; and adequacies of advanced technologies (active RF, passive RF, Infrared, Very High Speed Integrated Circuit-aided signal processing) to solve air-defense problems of increasing difficulty.

(U) RELATED ACTIVITIES: The Army Program Element, P.E. 63318A, is the Army counterpart of this element. However, since 1979, the program has been funded entirely through the Navy program element. Technology advances in Infrared and RF missile guidance under the current Multimode Guidance Project are potentially applicable to many future Army, Navy, Marine Corps, and Air Force missile developments, air-launched as well as surface-launched. In particular, the Multimode Guidance effort could produce technical approaches for guidance upgrades to the Navy's SM-2 missile and the Army's PATRIOT missile systems. The project is currently the only DoD missile guidance project devoted to proving tactical missile ability to function in the heavy countermeasures environments predicted for air defense warfare.

(U) WORK PERFORMED BY: Multi-Mode Guidance Project: General Dynamics Corporation, Pomona Division, Pomona, CA; Hughes Aircraft Company, Missile Systems Group, Canoga Park, CA; Johns Hopkins University - Applied Physics Laboratory, Laurel, MD; Naval Weapons Center, China Lake, CA - Lead Lab; Naval Surface Weapons Center, Dahlgren, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program element began in FY 1977 as a joint Army/Navy effort under DoD Program Memorandum No. 127. In FY 1977, Army/Navy defined requirements. The first project was Lightweight Low Cost Phased Array to develop lighter weight, lower cost phased array antennas for Army and Navy radar surveillance systems. Hughes Aircraft, Fullerton, CA, was awarded a competitive contract in September 1977 to build two prototype arrays - one built to Patriot specifications and one to AEGIS specifications. The project proceeded satisfactorily through antenna design and component fabrication but was terminated late in FY 1979 because of the program's inability to support a contractor-identified cost increase of 50% and a loss of Army interest to continue the effort. In FY 1977 and FY 1978 Advanced Surface-to-Air Ramjet project fabricated lightweight engines and demonstrated by ground testing their capability for both low altitude and high altitude full duration trajectories. This provided a ramjet engine baseline for Stand-Off Jammer Suppression missile investigations. In FY

Program Element: 63318N
DOD Mission Area: 231 - Anti-Air Warfare

Title: Army/Navy Surface-to-Air Missile (SAM) Technology
Budget Activity: 4 - Tactical Programs

1978 the Multimode Guidance Program began a review of technology to strengthen tactical air defenses against Army and Navy surface resources. Four contractors completed missile multimode guidance concept definitions in February 1979. In December 1979 Hughes Aircraft Company and General Dynamics Corporation were given contracts to develop detailed base designs and to carry out simulations and hardware experiments to confirm the soundness of their design approaches. There were initial design reviews in August 1980 and program reviews in January 1981. Though their implementations are different, each contractor's guidance design uses wide bandwidth passive radio frequency, active radio frequency, and infrared techniques. In 1981 the HIBAL Warhead Project completed its effort when New Mexico Institute of Mining and Technology successfully concluded a two-year warhead development work with catastrophic destruction of a mock-up Backfire Bomber. The demonstrated warheads are optimized to achieve fuel-ingestion kill of both engines of the bomber. This new warhead technology is now available for inclusion in missile warhead designs effective against bombers, fighter planes, and cruise missiles.

2. (U) FY 1982 Program: The Multimode Guidance Project contractors will continue subsystem tests to confirm the validity of their guidance designs. They will also identify feasibility issues related to the use of infrared techniques to make advanced area defense missiles capable of engaging and destroying faster, higher flying air-to-surface missiles.

3. (U) FY 1983 Planned Program: Multi-Mode Guidance Project - The contractors will complete hardware tests validating their multimode guidance design for long-range missiles to defend against stand-off jammer and launch aircraft threats. They will begin design and fabrication of brassboard multimode guidance units to be field-tested and captive-flight tested in realistic environments with emphasis on dense electronic countermeasures presence. The contractors will conduct tests of infrared guidance subsystems to confirm the feasibility of infrared guidance for area defense missiles.

4. (U) FY 1984 Planned Program: Multi-Mode Guidance contractors will continue fabrication, integration and in-house testing of their brassboard guidance units. A Government test plan will be developed and supporting test instrumentation will be built.

5. (U) Program to Completion: Multimode Guidance Project - In FY 1985 General Dynamics and Hughes Aircraft will complete their brassboard multimode guidance units and deliver them for Government field tests and captive flight tests. These tests will be conducted in FY 1986 or early FY 1987. The program (Army/Navy Surface-to-Air Missile (SAM) Technology) is a continuing one. When the Multimode Guidance Project is in final completion, a new project will be chosen for start, based on the highest priority technology needs of Army/Navy/Marine Corps area defense surface-to-air missile requirements and problems at that time.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63367N
Title: Common Anti-Submarine Warfare Standoff Weapon
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	19,027	39,578	41,999	58,167	715,829	881,600 1/
S0883	Submarine ASW Standoff Weapon	19,027	0	0	0	0	26,027
S1669	Common ASW Standoff Weapon	0	39,578	41,999	58,167	715,829	855,573
	(Quantity - Advanced Development Models		(DT&E/OT&E)				(7)
	Engineering Development Models					(DT&E/OT&E)	(18)
	Operational Evaluation Models)					(DT&E/OT&E)	(60)

1/ Includes $7,000 thousand in project S0883 in FY 1980

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The lack of an effective attack and kill capability against the projected [redacted] threat at ranges that match our projected detection capability is a serious deficiency in ASW planning. At present, submarine kill capability has matched Submarine ASW targeting capability through employment of two weapons: Torpedo MK 48 at short to intermediate ranges and SUBROC at standoff ranges. Current plans provide for the retirement of SUBROC beginning [redacted] because it will be obsolete and unsupportable. Projected improvements in Soviet submarine localization and targeting coupled with their existing long range weapons and higher speed submarines demand a new submarine-launched ASW Standoff Weapon capability. Surface ship ASW attack capability has also matched its ASW sensor and targeting capability through employment of two weapon suites: ASROC at short ranges and the SH-60B helicopter (Light Airborne Multi-Purpose System), equipped with lightweight torpedoes, at long ranges. ASROC will not be compatible with the surface ship Vertical Launch Systems which will appear in the fleet in the mid-1990's and will be [redacted] of range capability. The Light Airborne Multipurpose System is not a quick-reaction weapons system. The Common ASW Standoff Weapon Program is intended to correct these deficiencies by developing a long-range quick reaction anti-submarine weapon which is compatible with both submarine and surface ship launch and sensor capabilities.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Execute the first full year of the FY 1982 Demonstration and Validation Phase contract. The remainder of the FY 1983 funds will be used by Navy activities to: (1) continue preparation of Navy facilities to be used in Demonstration and Validation testing by the conractors, (2) continue design of submarine modifications required for integration of the Anti-Submarine Warfare Standoff Weapon, (3) continue plans for design modifications required for surface ship integration, (4) continue support of Tactical Development for Anti-Submarine Warfare Standoff Weapon application and (5) provide engineering and

Program Element: 63367N
Title: Common Anti-Submarine Warfare Standoff Weapon
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

management support required to produce all required documentation for management control, logistics and training, reliability and maintainability. The increase in funding from FY 1982 to FY 1983 is for minor increases in advanced development subsystem model fabrication and testing. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the (amended) FY 1982 Decriptive Summary and this Descriptive Summary are as follows: (1) The program was reviewed and restructured at the end of FY 1981 by termination of the Submarine Launched ASW Standoff Weapon program (project S0883) and starting a new project (S1669 - Common ASW Standoff Weapon) in FY 1982. (Project S1669 is not shown on the FY 1982 Descriptive Summary.) This action was taken by the Chief of Naval Operations in view of the need to meet Surface Launched ASW Standoff Weapon requirements in addition to those addressed by project S0883. The total cost of project S0883, as of its termination, is shown. (2) FY 1981 funding has decreased by $4 due to revised inflation rates. (3) The FY 1982 estimate has decreased by $10,506 due to the above restructuring. (4) Estimates of the required quantities of test items associated with the planned Demonstration and Validation and Full Scale Engineering Development phases are shown.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,000	19,031	50,084	TBD	TBD	TBD
S0883	Submarine ASW Standoff Weapon	7,000	19,031	50,084	TBD	TBD	TBD
	(Quantity - Advanced Development Models)		(DT&E)				TBD

(U) OTHER APPROPRIATIONS FUNDS: None

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63369N
Title: Air Launched TOMAHAWK
DoD Mission Area: 223 - Close Air Support and Interdiction
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	22,548	19,000	19,900	19,760	29,530	110,738*
X0650	Air Launched TOMAHAWK	22,548	19,000	19,900	19,760	29,530	110,738

*Includes funding for the Air Launched TOMAHAWK program for FY 1981 and out only.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Navy funding supports common item development and the Air Force development schedule. This advanced standoff missile can strike high value, heavily defended land and sea targets from ou side the lethal envelopes of most enemy defenses. The missile will allow highly accurate attack of key target structures from long standoff distances under day, night and adverse weather conditions, thereby reducing attrition of our strike aircraft. The quality and capability of present and projected ground based defensive systems provide the urgency in acquiring a highly survivable standoff weapon system. The current program provides for two variants, the Air Force AGM-109H, for airfield attack, and the Navy AGM-109L, a dual mission anti-ship/land attack version. Both variants will incorporate the same propulsion and Terrain Contour Matching and Digital Scene Matching Area Correlator. In addition, the Navy AGM-109L will incorporate [redacted] and data link to provide a man-in-the-loop capability.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funds will be used to complete common item system integration, contractor test and evaluation, and government development and operational testing of the Air Force AGM-109H. This effort includes system integration of the following major components; inertial guidance system, Digital Scene Matching Area Correlator, and a turbojet engine. It also includes integration of the AGM-109L into the weapons system of the A-6E.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary (-211 in FY 1981, -19,635 in FY 1982 and -19,857 in FY 1983) are due to Congressional and Navy action resulting in a new program in FY 1982.

Program Element: 63369N
DoD Mission Area: 223 - Close Air Support and Interdiction

Title: Air Launched TOMAHAWK
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	22,000	22,759	38,635	39,757	To be determined	

(U) OTHER APPROPRIATION FUNDS: Other appropriation funding to be determined.

Program Element: 63369N
Title: Air Launched TOMAHAWK
DoD Mission Area: 223 - Close Air Support and Interdiction
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Air-to-Surface Missile will supplement conventional, short range air launched weapons and anti-radiation missiles by providing operational commanders an alternative to the commitment of a large force to attack a single high value, heavily defended target. Through the ability to attack targets from beyond the range of most defenses, aircraft survivability will be enhanced. The Joint Medium Range Air-to-Surface Missile program was initiated in FY 1979 as a supersonic air launched low volume ramjet but was later changed to an air launched variant of TOMAHAWK. The principal required system characteristics are: high survivability, man-in-the-loop for target identification, aim point selection and tactical flexibility, effectiveness against land and sea targets, compatibility with the carrier environment and a conventional (non-nuclear) warhead. The scope of effort needed to develop and deploy the air launched TOMAHAWK includes adding an [ ] and a Walleye Phase II data link. It also requires changing the current TOMAHAWK inertial guidance system [ ] changing the Williams Research Turbofan Engine to a Teledyne Turbojet and shortening the TOMAHAWK airframe to a length compatible with aircraft carrier weapons elevators and to facilitate external carriage on Navy and Air Force tactical aircraft. Because TOMAHAWK is a modular design, new warhead and guidance modules can be developed for use by either service as the operational requirements dictate. The air launched TOMAHAWK will employ state-of-the-art microprocessor based guidance and control systems including a [ ] *gyro navigation unit.* Two Air Launched TOMAHAWK variants are planned for development: AGM-109H, and AGM-109L. The Navy AGM-109L dual mission ship/land attack variant is intended for launch from the Navy A-6E aircraft and will be carrier (CV) compatible. The missile will be shorter and weigh less than earlier TOMAHAWKS, but will otherwise retain the basic aerodynamic design approach used for other TOMAHAWK missiles. The payload will be the HARPOON Warhead (WDU-18/B). The design of this warhead and its associated fuze/booster has been completed and qualified. The baseline engine for all variants will be a modified Teledyne J-402 HARPOON engine. Modifications will be tested to insure compatibility with both vehicles and missions. The guidance elements for all air launched variants will use the high speed digital data bus, Terrain Contour Matching and Digital Scene Matching Area Correlator. In addition, the Navy variant will employ a modified [ ] and Phase II Walleye Data Link for the ship attack role. The second variant, AGM-109H Airfield Attack Missile, is intended for use by the Air Force. It is longer and heavier than the AGM-109L, but the [ ] guidance, engine and some airframe structure designs for the AGM-109L are applicable to this variant. The payload for the AGM-109H will be an airfield attack munition now under development. The [ ] development represents the major new effort for this variant.

(U) RELATED ACTIVITIES: This development is supported by related developments in TOMAHAWK (PE 64367N) and Air Launched Cruise Missle (PE 64361F). Additionally, the Air-to-Surface Missile Guidance Technology Project under PE 63306N has demonstrated the feasibility of a higher performance, low cost, inertial guidance unit based on [ ] concepts. The engine is a modification of that developed under PE 63312N for HARPOON. The Air Force funding is in the Medium Range Air-to-Surface Missile Program (PE 64614F).

(U) WORK PERFORMED BY: The airframe is manufactured by the General Dynamics Corp., Convair Division, San Diego, CA: the guidance system integrator is McDonnell Douglas, Astronautics Corp., St. Louis, MO. Major guidance subsystems are manufactured by Litton

Systems, Woodland Hills, CA. The missile engine is manufactured by Teledyne/CAE, Toledo, OH. Major in-house development agencies for the missile are the Naval Weapons Center, China Lake, CA, which performs aircraft weapon system integration and warhead development. The Pacific Missile Test Center, Point Mugu, CA, and the Naval Air Test Center, Patuxent River, MD, will play major roles in system test and evaluation. A number of other commercial and governmental agencies will be involved in subsystem design, development and test as the development progresses. The Air Force effort for this joint development has been delegated to the Armament Division, Eglin AFB, FL, by the Air Force Systems Command. The Air Development Test Center and other Air Force laboratories and centers will assume major roles in system development as integration with Air Force aircraft and mission requirements proceed.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: Evaluation of the Air Launched Low Volume Ramjet propulsion system with advanced tactical inertial navigation system and [redacted] terminal guidance was conducted. An analysis of three candidate systems was initiated, the Supersonic Ramjet with [redacted] terminal guidance, the Improved HARPOON with [redacted] and Data Link, and the Tactical Air Launched Cruise Missile adapted from the TOMAHAWK missile. This analysis was not completed until April, 1981. Meanwhile, a decision was made by the Under Secretary of Defense for Research and Engineering to pursue development of two air launched variants based on TOMAHAWK components which would satisfy both Air Force and Navy Medium Range Air-to-Surface Missile requirements. An aircraft carrier demonstration program was initiated for early confirmation of the suitability and compatibility of an air launched TOMAHAWK when employed by carrier based aircraft. Design trade studies were conducted from among developed/available subsystem and warheads. Initial investigation of the capatibility of existing [redacted] designs and hardware and the required interface with the airframe was also commenced. A residual asset from the TOMAHAWK/Air Launched Cruise Missile competitive flyoff was modified for aircraft catapult, arrested landing and carrier compatibility testing. Basic integration of that missile into the A-6E weapon system was accomplished. The carrier compatibility testing was limited to demonstrating that a missile of this size and weight could be handled on and launched from an aircraft carrier. It included onboard support equipment handling demonstrations, elevator clearance checks and magazine compatibility verification. A captive flight test from the carrier was conducted with a representative operational profile flown.

Definition and integration investigation phase continued through late FY 1981 and the baselines for both AGM-109H and AGM-109L are currently being established.

2. (U) FY 1982 Program: Initiate Full Scale Engineering Development on all common aspects of both Medium Range Air-to-Surface Missile variants. Aircraft integration and breadboard/prototype testing of avionics components commence in late FY 1982. Mid Course Guidance Program demonstration flights will validate Digital Integrating Subsystem computer, [redacted] and Federated

Program Element: 63369N
Title: Air Launched TOMAHAWK
DoD Mission Area: 223 - Close Air Support and Interdiction
Budget Activity: 4 - Tactical Programs

Bus design concepts to be used on all Medium Range Air-to-Surface Missile variants. Navy funds in FY 1982 will contribute to common item development of the AGM-109H/L missiles and to gain a full understanding of development and procurement costs plus an assessment of the long term utility of this weapon to the Navy.

3. (U) FY 1983 Program: Navy funding in FY 1983 is sufficient to keep common item development on schedule. System design and integration will continue. Navy unique] Data Link and A-6E integration/modification will be a minimum to keep an option open to continue development when Navy is satisfied that the questions of cost, tactical utility and survivability of the air launched TOMAHAWK variant are satisfactorily answered.

4. (U) FY 1984 Planned Program: The majority of common item development will be completed in FY 1982-1983. Navy funds in FY 1984 can then be used to start low level effort on AGM-109L unique requirements. System design and integration efforts on] and Data Link will continue. A-6E integration efforts will commence and aircraft carrier mission planning requirements definition wil be completed, at which time a better understanding of the full development and procurement costs will be gained.

5. (U) Program to Completion: To be determined.

6. (U) Milestones:

Milestones	Date
1. Initiated Full Scale Engineering Development	1 October 1981
2. First Medium Range Air-to-Surface Missile free flight	To be determined
3. Initial Operational Capability per AGM-109L	To be determined

Program Element: 63369N
DoD Mission Area: 223 - Close Air Support and Interdiction

Title: Air Launched TOMAHAWK
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: The test program is structured to take advantage of component and flight testing completed or planned for items common with other TOMAHAWK variants while emphasizing unique air launched subsystems and stressing operational factors. The Air Force and the Navy have agreed to integrate test and evaluation of the air launched variants to the maximum extent practical to eliminate duplication and minimize test hardware requirements. The need for Service-unique Operational Test and Evaluation has been recognized and each service is to be solely responsible for all facets of its peculiar testing.

a. (U) An air launched TOMAHAWK carrier demonstration program was conducted by General Dynamics-Convair Division, McDonnell Douglas, and the Naval Weapons Center, China Lake, CA, from May-November 1980 to provide preliminary confirmation of the suitability and compatibility of the 192 inch, 2200 pound variant of TOMAHAWK when employed by carrier-based aircraft. It should be noted that, although the size and weight were representative of AGM-109L, the following components were different: warhead, fuzing, engine, terminal and mid-course guidance units, and aircraft interface. The information and studies resulting from this program have provided some data for the Full Scale Engineering Development program.

b. (U) The Medium Range Air-to-Surface Missile Full Scale Engineering Development program began in July 1980. Overall objectives for the program include: (1) qualification of the missile for launching from Air Force/Navy aircraft and demonstration of missile compatibility with the launch aircraft; (2) demonstration of CV suitability; (3) evaluation of missile performance; (4) demonstration of a missile capability to fly routes planned by a theater mission planning subsystem, achieving the required terminal accuracy; (5) demonstration of man-in-the-loop capability for target identification, aim point selection and damage assessment; (6) demonstration of operational effectiveness and suitability; and (7) demonstration of launch/flight profiles, safety, and reliability.

c. (U) An extensive laboratory/ground test program will be conducted, to include component, major assembly, and system qualifications tests, stress tests, environmental tests, electromagnetic compatibility tests, and carrier handling tests to verify compatibility of the Navy variant with aircraft carrier weapons handling and storage capabilities. Particular emphasis in testing of the AGM-109L and AGM-109H variants will be placed on those components [inertial guidance, Tactical Airfield Attack[,] Tactical Airfield Attack Submunition dispenser, [ ]Seeker, Data Link, modified HARPOON engine) and systems not common with other TOMAHAWK variants. Captive-carry flight testing will be utilized to develop the aircraft/missile interface, to establish a captive carry reliability data base, and test the performance of weapon guidance and target acquisition functions. Free-flight tests will be conducted to further test these functions, aircraft/missile separation, and the missile's flight control and propulsion systems in order to verify compliance of each variant with the system specifications and to obtain an initial estimate of operational effectiveness and suitability.

d. (U) The first free-flight test of the AGM-109H is planned for the 2nd Quarter FY 1984. Flight tests of the AGM-109L are to be determined. Some flights will terminate with target impact and others with recovery of the test vehicle using the Recovery Exercise Module parachute recovery system developed for TOMAHAWK.

2. (U) OPERATIONAL TEST AND EVALUATION: Commander Operational Test and Evaluation Force is the responsible test organization for Navy Operational Evaluation of the AGM-109L Airfield Attack Missile. The Air Force Test and Evaluation Center will be responsible for Air Force operational effectiveness and suitability testing of the Medium Range Air-to-Surface Missile when employed in its intended environment. Additionally, they will provide data for deployment and for refinement of tactics, techniques, and doctrine.

3. (U) SYSTEM CHARACTERISTICS:

Characte- stics	Threshold
Range-Operational	
Launch Altitude	
Minimum	
Maximum	
Cruise Speed	
Cruise Altitude	
Missile Length/Weight (in/lb)	
Navy	
Air Force	
Terminal Accuracy	
Navy	
Air Force	

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63382N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Battle Group Anti-Air Warfare Coordination
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,683*	0	6,458	12,726	Continuing	Continuing
S0324	Battle Group Anti-Air Warfare Coordination	5,683*	0	6,458	12,726	Continuing	Continuing

*Under Program Element 64303N, Area Air Defense

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Soviet Union's ever-increasing capability to coordinate high-density air attacks against Battle Groups requires a more effectively coordinated response. Today, that response is limited by the accuracy, timeliness, and completeness of the targeting information available and by the control of its dissemination. The result is inefficient weapons laying. Some targets are not engaged, while others are multiply-engaged. It also leads to over commitment of some units while others remain uncommitted. The introduction of the first AEGIS ship, TICONDEROGA, in 1983, offers the opportunity to improve on these situations. With her superior radar surveillance, detection and tracking capabilities, more information will be available. This program capitalizes on the AEGIS data, control, display and decision systems to coordinate the weapons and sensors of other ships and aircraft within a Battle Group. Near and long term upgrades will achieve higher degrees of battle coordination. Battle Group Anti-Air Warfare Coordination objectives will be met in phases. The first phase calls for the dissemination of AEGIS data to the Battle Group. The second phase involves force weapon scheduling and remote designation, and the final phase is the implementation of advanced weapon control techniques such as one ship providing mid-course guidance to another ship's missiles.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Install Naval Tactical Data System Link 11 data transfer system in USS NORTON SOUND and start assessment of Battle Group data link management and interface requirements. Determine requirements for designated non-AEGIS ships and aircraft types. As this is a continuing program the above funding includes outyear escalation and encompasses all development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) Funded under PE 64303N, Area Air Defense in FY 1981. No funding for FY 1982 was requested in the President's Budget due to budget constraints. A decrease of $148 in FY 1981 was for travel reductions. An increase of $6,458 in FY 1983 is provided to reactivate the program.

ram Element: 63382N
Mission Area: 231 - Anti-Air Warfare

Title: Battle Group Anti-Air Warfare Coordination
Budget Activity: 4 - Tactical Programs

FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Funding shown below was reflected in the FY 1982 Program Element Descriptive Summary for Program Element 64303N Area Air Defense.

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	Not applicable.	New Program Element in FY 1983				
0*	Battle Group Anti-Air Warfare Coordination	6,086	5,831	0	0	Continuing	Continuing

FY-1982 Descriptive Summary under Program Element 64303N Area Air Defense

OTHER APPROPRIATION FUNDS: TBD

Program Element: 63382N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Battle Group Anti-Air Warfare Coordination
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Soviet Union's ever-increasing ability to deploy a diversified, coordinated, high density air attack on battle groups has dramatized the need to better coordinate the response against such attacks within the Battle Group. Today, such a response is constrained by the limits of radio communications, pre-planned battle doctrine and other manual operations. The Battle Group Anti-Air Warfare Coordination Program provides major improvements in Anti-Air Warfare effectiveness through more effective use of the AEGIS ship to coordinate all force Anti-Air weapons. With this improved coordination, all Anti-Air Warfare sensors and weapons within a Battle Group can be employed more effectively. The introduction of a basic system in TICONDEROGA and representative TARTAR and TERRIER ships will allow the sharing of AEGIS data within the Battle Group. This track data will be transmitted over existing Naval Tactical Data System Link 11 and 4A. Non-Naval Tactical Data System units will receive the data via Link 14 from other units.

(U) RELATED ACTIVITIES: Program Element 64303N, AEGIS; Program Element 64307N AEGIS Product Improvement; Program Element 64366N, STANDARD Missile Improvements; Program Element 63516N, Radar Surveillance Equipment; Program Element 63519N, Advanced Command Data Systems; Program Element 62721N, Command and Control Technology; Program Element 25604N, Joint Tactical Information Distribution System; Program Element 62712N, Surface and Aerospace Target Surveillance Technology.

(U) WORK PERFORMED BY: Contractors: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; RCA, Moorestown, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: In 1979, development of a land based prototype of the Battle Group Anti-Air Warfare Displays, the interactive elements, Automatic Gridlock equipment, and computer programs commenced. In 1980, development of an atses development model started. The continuous automatic gridlock computer algorithm was tested satisfactorily. Initial feasibility studies for a data link were completed. Modifications to existing TARTAR/TERRIER computer programs were defined for other Battle Group ships and a study of current Anti-Air Warfare assets and the coordination requirements to enhance capabilities in both AEGIS and non-AEGIS Battle Groups was completed. A listing of ship classes and aircraft types for installation of Automatic Gridlock equipment testing was established. In 1981, the laboratory development model for the Battle Group Anti-Air Warfare Display Group was demonstrated. Link 11 modifications were defined and suggested standards for Joint Tactical Information Data System were forwarded. Demonstration of Automatic Gridlock continued.

2. (U) FY 1982 Program: Not funded.

3. (U) FY 1983 Planned Program: Install Link 11 installation in USS NORTON SOUND. Continue development of requirements and performance specifications for participating units.

Program Element: 63382N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Battle Group Anti-Air Warfare Coordination
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Integrate and checkout Link 11 installaion in USS NORTON SOUND. Start test and evaluation of data Links for at-sea Battle Group Anti-Air Warfare Coordination demonstration.

5. (U) Program to Completion: Conduct at-sea testing of Battle Group Anti-Air Warfare Coordination elements in USS NORTON SOUND. Complete performance specifications for participating units and conduct at-sea evaluation. Start ship and aircraft modifications. Upgrade Battle Group Anti-Air Warfare Coordination development models to incorporate the Joint Tactical Information Distribution System and satellite navigation capabilities. Develop and test advanced Anti-Air Warfare weapon laying techniques. Longer range upgrades will continue to evolve the level of coordination required to retain desired Battle Group capability for the future.

6. (U) Milestones:

Milestones	Date
1. Complete requirements definition for participating units	January 1984
2. Start Link 11 checkout in USS NORTON SOUND	September 1984
3. Complete Link management and interface requirements	September 1984
4. Start data link test and evaluation	December 1985
5. Start participating unit test and evaluation	January 1985
6. Complete participating unit engineering development	June 1985
7. Start ship and aircraft modifications	November 1985

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63501N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Reactor Propulsion Plants
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,687	6,062	5,812	5,689	Continuing	Continuing
S0292	Natural Circulation Nuclear Propulsion Plant	412	0	0	0	Continuing	Continuing
S0409	S6G Nuclear Attack Submarine Propulsion Plant	7,275	6,062	5,812	5,689	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element supports the development and testing of a [ ] nuclear propulsion plant for use in the SSN 688 Class submarines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue support of SSN 688 Class submarines in construction, testing and operation. Continue redesign efforts [ ] Initiate advanced design work [ ]. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: the decrements in the FY 1982 and FY 1983 funding estimates ($7 and $204 respectively) are the result of a revised estimate of program needs in FY 1983 and downwardly adjusted inflation factors for both fiscal years.

Program Element: 63501N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Reactor Propulsion Plants
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,830	7,687	6,069	5,987	Continuing	Continuing
S0292	Natural Circulation Nuclear Propulsion Plant	489	412	0	0	Continuing	Continuing
S0409	S6G Nuclear Attack Submarine Propulsion Plant	7,341	7,275	6,069	5,987	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: The SSN 688 Class Selected Acquisition Report, which is updated quarterly, contains other appropriation funding provided in support of S6G Nuclear Attack Submarine Propulsion Plants.

Program Element: 63501N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Reactor Propulsion Plants
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Nuclear Attack Submarine Propulsion Plant project is directed toward the development, testing, and evaluation of a nuclear propulsion plant for the SSN 688 Class submarine. Utilizing the S6G plant, these attack submarines have achieved a sustained submerged speed

(U) RELATED ACTIVITIES: Work conducted under this project is closely coordinated with the effort of other naval nuclear propulsion research and development projects and the Department of Energy, Office of the Deputy Assistant Secretary for Naval Reactors, research and development work on nuclear reactor plants.

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

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0292: Operational evaluation of the natural circulation plant in the land based prototype led to improvements in design and plant parameters. Plant performance parameters such as ship motion and attitude, vibration and shock, and thermal transients were reviewed and evaluated

Project S0409: Evaluation of reactor system designs in later SSN 688 Class submarines continued. The effort to monitor the design adequacy associated with the S6G reactor plant continued. This effort is accomplished by evaluating operational data of SSN 688 Class submarines. Shield engineering was conducted including development of new plant shield designs, modifications to existing plants, performance of shield design analyses, and preparation of shield design description and shield surveys. Shielding analyses were conducted in support of the SSN 688 Class shipbuilding program. Tests were performed on a new material The extensive design effort was completed. effort was required due to operating problems encountered with the current design motor generator units. Electrical and system design support was provided for SSN 688 Class submarines. This effort included equipment modification, post shakedown availabilities, and resolution of problems. The improvement of technology and components continued.

Program Element: 63501N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Reactor Propulsion Plants
Budget Activity: 4 - Tactical Programs

Liaison was maintained between the laboratories and shipbuilders to resolve problems which developed during construction, testing, and operating of SSN 688 Class submarines.

2. (U) FY 1982 Program: Continue resolution of problems arising during construction and testing of SSN 688 Class submarines. Continue to provide design support for operating SSN 688 Class submarines to resolve problems. Continue the program to improve the performance and reliability of components. Perform a conceptual redesign of the S6G in order to upgrade performance margin. Continue the redesign effort

3. (U) FY 1983 Planned Program: Provide support for SSN 688 Class submarines in the construction and testing phases. Continue to provide necessary design support to the shipbuilder, lead design yard, and reactor planning yard. Initiate advanced design work for equipment in order to provide increased accuracy and reliability in equipment. Perform qualification testing the Continue the redesign effort for This effort is required to improve performance.

4. (U) FY 1984 Planned Program: Continue to provide design support to the shipbuilder, lead design yard and reactor plant planning yard for SSN 688 class submarines in the construction and testing phases. Continue the design effort for Effort will also be directed toward resolving design technical problems. Continue the efforts in order to improve performance margin.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	22,288	40,547	31,572	25,389	Continuing	Continuing
S0260	Advanced Minehunting Sonar System	9,818(1)	12,010	15,714	14,948	Continuing	Continuing
S0262	Influence Mine Countermeasures	2,141	8,215	(2)	(2)	(2)	(2)
S1018	CHANNEL FINDER	2,041	762	197	0	0	10,823
S1233	Mine Countermeasures Improvements	8,288	9,350	9,640	7,932	Continuing	Continuing
S1404	Mine Neutralization System	0	10,210	6,021	1,397	Continuing	Continuing
S1597	Surface Ship Magnetic Silencing	0	0	0	1,112	Continuing	Continuing

Notes: (1) Includes Mine Neutralization System development expenditures as part of Project S0260 during FY 1981.
(2) Starting in FY 1983, Influence Mine Countermeasures effort will be included under PE 64576N, Influence Mine Countermeasures, Project S1677, Explosion Resistant Multi-Influence Sweep System and Project S1670, Hydrofoil Pressure/Acoustic/Magnetic Sweep System.

Systems to be used through Operational Test and Evaluation (Quantity): Project S0260 - Advanced Minehunting Sonar System (2); Project S0262 - Hydrofoil Pressure/Acoustic Magnetic Sweep (3); Explosion Resistant Multi-Influence Sweep System (1); Project S1018 CHANNEL FINDER-AN/WQN-1 (V) Sonar (2); Project S1233-AN/SQQ-30 Minehunting Sonar (2), AN/SSN-2 Precise Integrated Navigation System (2), ALFA TWO Countermeasures Set (2), Single Ship Deep Sweep (2); Project S1404 - Mine Neutralization System (2); Project S1597 - Surface Ship Magnetic Silencing (to be determined).

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for development of surface mine countermeasures systems which will enable surface ships and submarines to operate with relative safety in mineable water areas in support of the Navy's sea control, projection of force and strategic deterrence missions. A capability for minehunting/neutralization to depths of [redacted] feet and countering of pressure-combination mines in shallow water are essential elements of a surface mine countermeasures capability. Deep water minehunting will require a variable depth minehunting sonar with a capability for detecting moored mines at ranges of [redacted] and a mine neutralization vehicle capable of cutting mine mooring cables or placing neutralization charges within a few feet of bottom mines. In countering buried or multi-influence pressure mines two approaches will be followed: Hydrofoil Pressure/Acoustic/Magnetic Sweep System - This system will employ the hydrofoil (PHM) ship pressure signature

which is similar to that of a large, slower moving displacement hull and is sufficiently astern of the hydrofoil to ensure the hydrofoil is not damaged by the mine it sweeps. Explosive Resistant Multi-Influence Sweep System - This system will employ positive displacement explosion resistant hulls to simulate ships [ ]. The CHANNEL FINDER System is required to permit safe transit of surface ships and submarines through areas where a [ ] threat exists. The Mine Countermeasures Improvement project is needed to reconfigure the AN/SQQ-14 Minehunting Sonar to the more capable AN/SQQ-30 Minehunting Sonar, to develop a Precise Integrated Navigation System, to develop ALFA TWO, a surface ship towed version of the helicopter-towed DOUBLE ALFA AN/ALQ-141 Countermeasures Set and to develop a Single Ship Deep Moored (mechanical) Sweep. The Surface Ship Magnetic Silencing project will develop shipboard degaussing/countermeasures system components to upgrade the capabilities of Navy ships to avoid mines actuated by magnetic influences.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0260, Advanced Minehunting Sonar System - Complete prototype detection sonar tests and continue engineering development contract for Advanced Minehunting Sonar System. Project S1018, CHANNEL FINDER - Complete procurement documentation and initiate production procurement. Project 1233, Mine Countermeasures Improvements - Design and fabricate engineering development model of ALFA TWO Countermeasures Set. Modify AN/SQQ-30 Minehunting sonar system for integration with mine countermeasures ship combat system and continue system production. AN/SSN-2 Precise Integrated Navigation System - Complete technical and operational evaluation. Obtain approval for service use. Award contract to refurbish engineering development models for installation on lead MCM-1 Class ship and use as a trainer. Single Ship Deep Moored Sweep - (Being developed under the aegis of NATO Naval Armaments Group Project Group 22) - Award engineering development contract. Project S1404, Mine Neutralization System - (Prior to FY 1982, development of the Mine Neutralization System was included in Project S0260, Advanced Minehunt and Neutralization). Implement design changes to reduce magnetic signature of winch and handling systems and increase hardness against explosive shock. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are: Project S0260, Advanced Minehunting Sonar System - Funding increased by 2,547 in FY 1981 to pay for cost growth in the Mine Neutralization System development contract, decreased by 291 in FY 1982 due to Navy budget adjustments and increased by 799 in FY 1983 to continue development of the Advanced Minehunting Sonar System on an optimum schedule. Project S0262, Influence Mine Countermeasures (formerly Pressure/Acoustic/Magnetic Minesweeping System) - Funding decreased by 1,845 in FY 1981 due to reprogramming to higher priority efforts and decreased by 239 in FY 1982 due to this project absorbing part of an undistributed congressional reduction in research and development funding. Project reductions to zero in FY 1983 and FY 1984 are due to shifting the project to engineering development under Program Element 64576N, Influence Mine Countermeasures. Project S1018, CHANNEL FINDER increased by 297 in FY 1981 due to an adjustment in inflation indices and decreased by 51 in FY 1982 due to this project absorbing part of an undistributed Congressional reduction in research and development funding. A reduction of 5 in FY 1983 is due to an adjustment in inflation indices. Project S1233, Mine Countermeasures Improvements - Funding decreased by 705 in FY 1981 due to reprogramming to higher priority

efforts funding decreases by 417 in FY 1982 due to this project absorbing part of an undistributed Congressional reduction in research and development funding and decreases by 300 in FY 1983 due to a decision to fund higher priority programs. This will result in a stretch out of the development schedule for the ALFA TWO Countermeasures Set and Single Ship Deep Moored Sweep. Project S1404, Mine Neutralization System - Funding decreased by 261 in FY 1982 due to this project absorbing part of an undistributed Congressional reduction in research and development funding. Funding increases by 3,313 in FY 1983 to implement system shock and non-magnetic redesigns brought about by change in design of the MCM-1 Class Mine Countermeasures Ship from a large steel hull to a smaller low-magnetic wood/glass reinforced plastic ship.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	17,030	21,994	41,806	39,614	Continuing	Continuing
S0260	Advanced Minehunting Sonar System	10,458	7,271	12,301	14,915	Continuing	Continuing
S0262	Pressure/Acoustic/Magnetic Minesweeping System	2,061	3,986	8,454	11,849	Continuing	Continuing
S1018	Channel Finder	2,492	1,744	813	202	0	10,582
S1233	Mine Countermeasure Improvements	2,019	8,993	9,767	9,940	Continuing	Continuing
S1404	Mine Neutralization System	0	0	10,471	2,708	0	38,000*

*Includes FY 1981 and prior year expenditures when Mine Neutralization System development was part of Project S0260.

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Surface Mine Countermeasures
Budget Activity 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for development of surface mine countermeasures systems which will enable surface combatants, submarines, amphibious force ships and logistic support ships to operate with relative safety in deep and shallow mineable water areas in support of the Navy's sea control, projection of force and strategic deterrence missions. The surface mine countermeasures systems being developed under this Program Element and systems being developed under Program Element 63260N, Airborne Mine Countermeasures are complementary and compatible; both capabilities are essential to counter the Soviet mine threat. The Surface Mine Countermeasures development program is structured to counter the deep water[ ]mines as well as shallow water bottom mines; whereas, the Airborne Mine Countermeasures development program is structured to counter sensitive shallow water mines which are a threat to surface mine countermeasure ships. The Soviets are known to possess deep moored anti-submarine/surface ship mines and pressure combination mines[ ] Soviet stockpiling of deep moored mines and the corresponding increase in the extent of mineable areas contrasted with programmed U.S. Navy mine countermeasures force levels show that dedicated mine countermeasure forces are inadequate. In response to these deficiencies, there is a requirement for systems which will provide high value ships and submarines with a self-protection capability as well as improved minehunting and minesweeping capabilities for dedicated mine countermeasure assets. The following systems, to be developed within this program element, will provide the Fleet with (1) a counter to deep moored and pressure combination mines, (2) counters to active acoustic mines, (3) self-protection systems for high value surface ships and submarines and (4) minehunting sonars, neutralization vehicles and precise navigation systems. The Program Element consists of: Project S0260, Advanced Minehunting Sonar System - This system will detect, localize and classify both moored and bottom mines at depths Prior to FY 1982, both the Advanced Minehunting Sonar System and the Mine Neutralization System development tasks were conducted within Project S0260, Advanced Minehunting Sonar and Neutralization System. In FY 1982 these projects were separated, with the Mine Neutralization System development coming under Project S1404. Project S0262, Influence Mine Countermeasures (formerly Pressure/Acoustic/Magnetic Minesweeping System) - This system will sweep pressure combination influence mines[ ] set to attack ships[ ] Two approaches will be pursued. First approach: Employ the hydrofoil ship pressure signature (which is similar to that of large, slower moving displacement hulls and is sufficiently far astern of the hydrofoil to ensure the ship is not damaged by exploding the mine) along with complementary magnetic and acoustic sweep gear which will be adapted from projects in Program Element 63260M, Airborne Mine Countermeasures. Second approach: The NATO cooperative development of a self-propelled explosion resistant hull system that will be capable of simulating a ship[ ] This NATO cooperative development effort is entitled Explosion Resistant Multi-Influence Sweep System. Feasibility studies and explosive tests will be completed in FY 1982 with subsequent construction of an experimental prototype during the engineering development phase. Project S1018, CHANNEL FINDER - This system provides submarines and surface ships protection

] Project S1233, Mine Countermeasures Improvements - The effort under this project will improve the capability of the mine countermeasures systems scheduled for installation on new mine countermeasures ships: (1) adapt the airborne DOUBLE ALFA AN/ALQ-141 Countermeasures Set to surface ship use (ALFA TWO Countermeasures Set), (2) increase the maximum depth capability and improve

reliability/maintainability of the AN/SQQ-14 variable depth Minehunting Sonar by reconfiguring it to the AN/SQQ-30 Minehunting Sonar, (3) integrate commercially available navigation components into the AN/SSN-2 Precise Integrated Navigation System for installation on mine countermeasures ships and (4) adapt the airborne Controlled Depth/Rapid Deploy Moored Sweep being developed in Program Element 63260N, Airborne Mine Countermeasures for shipboard use as the Single Ship Deep Moored Sweep. Since some of the present 423 Class MSOs will be in commission until the late 1980s, improvements to the equipment on these ships will be included in this project as required. Project S1404, Mine Neutralization System - Develop a remotely controlled Mine Neutralization System which controls a tethered submersible capable of neutralizing mines [by either placing a neutralization charge near the mine or cutting its mooring cable. Project S1597, Surface Ship Magnetic Silencing - Develop shipboard degaussing countermeasure system components to defend against mines actuated by magnetic influences.

(U) RELATED ACTIVITIES: Sonar technologies developed under Program Element 62711N, Undersea Target Surveillance Technology, will be used in the development of the Advanced Minehunting Sonar System and Mine Neutralization Systems. The technology to support Influence Mine Countermeasures has been investigated in Program Element 62734N (Countermeasures Technology). Program Element 63260N, Airborne Mine Countermeasures has developed the AN/ALQ-141 Countermeasures Set and is developing the Controlled Depth/Rapid Deploy Moored Sweep which will be adapted for surface ship use as the Single Ship Deep Moored Sweep.

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL, and Naval Ocean Systems Center, San Diego, CA - lead laboratories; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ship Engineering Center, Philadelphia, PA; Naval Surface Weapons Center, White Oak, MD, and Dahlgren, VA; Naval Weapons Center, China Lake, CA; Naval Explosive Ordnance Disposal Facility, Indian Head, MD. Contractors: R.M. Vredenburg & Co., McLean, VA; NATO Project Office (PG-14), Koblenz, Germany; Applied Research Laboratories, University of Texas, Austin, TX; Westinghouse Electric Corporation, Baltimore, MD; General Electric Co., Syracuse, NY; Washington Analytical Services Center, Inc., Rockville, MD; Honeywell Marine Systems, Seattle, WA; Columbia Research Corp., Austin, TX; International Transducer Corp., Goleta, CA; Science and Management Resources Inc., Arlington, VA; AMAF, Columbia, MD; Maxfield Associates, Alexandria, VA; Sperry Marine, Charlottesville, VA; Boeing Marine, Seattle, WA; Tracor Sciences and Systems, Rockville, MD; Magnavox, Torrance, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0260, Advanced Minehunting Sonar System: Restructured the Sonar Minehunting System development program which had been designed for a larger (1800 ton) Ocean Mine Countermeasures ship to the Advanced Minehunting Sonar System which would be compatible with the smaller MCM-1 Class and MSH-1 Class mine countermeasures vessels. Received Rapid Development Capability designation for project in order to achieve an initial operational capability in FY 1988 vice 1992. Project S0262, Influence Mine Countermeasures: Hydrofoil/Pressure/Acoustic/Magnetic Sweep System - Conducted range testing of hydrofoils for pressure signatures. Conducted study and underway tests of existing high speed airborne minesweeping equipment (acoustic and magnetic) that may be adapted for hydrofoil tow [ ]

Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Surface Mine Countermeasures
Budget Activity 4 - Tactical Programs

Started design of a high speed acoustic sweep. Explosion Resistant Multi-Influence Sweep System - A five nation Memorandum of Understanding was signed in August 1978 for the Explosion Resistant Multiple Influence Sweep System program. Established the program office in Koblenz, Germany. Began studies of surface phenomena, propulsion systems, rubber products, structures and ship/mine interaction. Fabricated test section. Project S1018, CHANNEL FINDER: Completed technical and operational evaluation. Established configuration baseline. Received approval for service use. Completed reliability and environmental qualification and production specifications and drawings. Project S1233, Mine Countermeasures Improvements: AN/SQQ-30 Sonar - Completed technical and operational evaluation. AN/SSN-2 Precise Integrated Navigation System - Advanced development model installed and evaluated on USS PLUCK (MSO-460). Awarded development contract to Magnavox and initiated design effort for two engineering development models. Project S1404, Mine Neutralization System: Deep water testing completed on the advanced development model of the Mine Neutralization System and the contract for the engineering development model of the Mine Neutralization System awarded to Honeywell. Test plans for the Mine Neutralization System engineering development model technical and operational evaluations developed. Engineering development models began factory acceptance tests. Tests of the neutralization charge against live mines completed at a United Kingdom test site. Continued development, fabrication and testing of the explosive bomblet and cable cutter.

2. (U) FY 1982 Program: Project S0260, Advanced Minehunting Sonar System - Complete concept design phase and select contractor to develop engineering development models. Continue government tests of bottom reverberation and target mine response at various frequencies to assist with hardware and software development. Project S1404 Mine Neutralization System: Complete two engineering development models; install one on MSO for evaluation. Perform environmental tests on the second. Conduct technical and operational evaluation. Project S0262, Influence Mine Countermeasures - Hydrofoil, Pressure/ Acoustic/Magnetic Sweep System: Range two hydrofoil ships in formation with prototype sweep gear streamed. Award engineering development contract for three magnetic/acoustic power systems and high speed magnetic cable. Conduct towing tests with high speed magnetic sweep. Develop tactics and design shipboard installation. Complete design of high speed acoustic and magnetic gear. Explosive Resistant Multi-Influence Sweep System: Complete testing of ballast tank and rubber hull design. Complete surface phenomena study. Start preliminary design of the ship's hull. Complete negotiations for Memorandum of Understanding for advanced development. Complete cost estimates for propulsion system and hull. Project S1018, CHANNEL FINDER - Complete production data documentation and refurbish engineering development model for installation on the lead MCM-1 ship. Project S1233 Mine Countermeasures Improvements: AN/SQQ-30 Sonar - Obtain approval for service use. Award production contract. AN/SSN-2 Precise Integrated Navigation System - Complete fabrication. Begin technical evaluation. Single Ship Deep Moored Sweep - Complete procurement specification and award development contract. Conduct technical and operational evaluation.

3. (U) FY 1983 Planned Program: Project S0260, Advanced Minehunting Sonar System - Contractor continue design of engineering development models. Conduct preliminary and critical design reviews and commence fabrication of hardware. S1018, CHANNEL FINDER: Initiate production procurement. Project S1233, Mine Countermeasures Improvements: ALFA TWO Countermeasures Set - Complete

Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Surface Mine Countermeasures
Budget Activity 4 - Tactical Programs

Design analysis for engineering development models. AN/SQQ-30 Sonar - Continue production procurement. Implement product improvements for integration with MCM-1 Class ship. AN/SSN-2 Precise Integrated Navigation System - Complete technical and operational evaluation and obtain approval for service use. Single Ship Deep Moored Sweep - Initiate design and fabrication of engineering development model. Project S1404, Mine Neutralization System - Begin refurbishment and modification of engineering development models to production baseline.

4. (U) FY 1984 Planned Program: Project S0260, Advanced Minehunting Sonar System - Complete [redacted] of Advanced Minehunting Sonar System engineering development models. Project S1018, CHANNEL FINDER: Continue production. Project 1233, Mine Countermeasures Improvements: ALFA TWO Countermeasures Set - Complete fabrication. AN/SQQ-30 Minehunting Sonar - Procure hardware for MCM-1 Class ships. AN/SSN-2 Precise Integrated Navigation System - Deliver refurbished and modified engineering development model systems, one for use as trainer, the other to install on MCM-1. Single Ship Deep Moored Sweep - Continue design, fabrication, and test of engineering development model. Project S1404, Mine Neutralization System: Complete refurbishment of engineering development models. Deliver one to lead MCM-1 Class ship. Deliver the other as a trainer. Project S1597, Surface Ship Magnetic Silencing: Design and fabricate prototype countermeasure system components and perform studies and experiments to assess performance capabilities of these prototypes.

5. (U) Program to Completion: Project S0260, Advanced Minehunting Sonar System - Complete engineering development in FY 1985. Complete technical and operational evaluation in [redacted] and obtain approval for service use. Project S1018, CHANNEL FINDER: Continue production with initial operating capability [redacted] Project S1233, Mine Countermeasures Improvements: ALFA TWO Countermeasures Set - Complete technical and operational evaluation in [redacted] obtain approval for service use in FY [redacted] and award production contract in [redacted] AN/SQQ-30 Minehunting Sonar - Achieve initial operational capability [redacted] AN/SSN-2 Precise Integrated Navigation System - Install refurbished engineering development model system on MCM-1 Class ship. Procure production hardware for follow-on Mine Countermeasures ships. Single Ship Deep Moored Sweep - Conduct technical/operational evaluation and obtain approval for service use in [redacted] S1404, Mine Neutralization System: - Complete modification necessary for installation on the lead MCM-1 Class ship. Procure production hardware for follow-on ships. S1597, Surface Ship Magnetic Silencing: Complete development and operational testing of system components, schedule to be determined.

6. (U) Milestones: Not applicable.

: S0260
Element: 63502N
sion Area: 234 - Mine Warfare

Title: Advanced Minehunting Sonar System
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

TAILED BACKGROUND AND DESCRIPTION: This project will develop a surface ship mine detection and classification capability ill enable surface mine countermeasures ships such as the MCM-1 (FY 1982 program) and the MSH-1 (FY 1984 program) to detect dern moored and bottom mines at case depths and ranges which will enable the Mine Countermeasures forces to counter the with minimum threat to themselves. Together Project S1404, Mine Neutralization System, the Advanced Minehunting Sonar will provide the capability to detect, classify and neutralize unburied mines of all types, regardless of firing/sensor eristics including those such as pressure mines which cannot be countered by either surface or airborne influence sweeping. ystem is needed to fill a present deficiency in the U.S. capability to detect and counter those mines with the necessary to counter an aggressive Soviet mining campaign. Currently available surface ship minehunting equipment consists of the variable depth AN/SQQ-14 sonar. of the slow speed at which the AN/SQQ-14 can detect and classify mines, the area coverage rate is unacceptably In addition, the AN/SQQ-14 lacks the necessary

The system upgrading of the AN/SQQ-14 to the AN/SQQ-30 configuration will provide a cant improvement in reliability and increase deep moored minehunting capabilities but will not increase the range or area coverage rate. The Advanced Minehunting Sonar System will be capable of higher search/classification speeds expected to have up to 10 times the area coverage rate of the AN/SQQ-30. The Advanced Minehunting Sonar System is an th of the Shipborne Minehunting Sonar Project and is being designed to be used by MCM and MSH class mine countermeasures It will be more reliable and more easily maintained. It will have

The Advanced Minehunting Sonar will be used to detect and classify mines moored in the water column or resting on the bottom a mine has been detected by the Advanced Minehunting Sonar, the ship will

the Single Ship Deep Sweep may also be used for neutralization.

ELATED ACTIVITIES: Work accomplished in synthetic aperture sonar technology in Program Element 62711N, Undersea Target llance Technology, and work on the AN/BQS-15 Improvement Project S0239, Program Element 24281N, Submarines, is being red for possible use in the design of the Advanced Minehunting Sonar System.

Project: 30260 — Title: Advanced Minehunting Sonar System
Program Element: 63502N — Title: Surface Mine Countermeasures
DoD Mission Area: 234 - Mine Warfare — Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD. Contractors: Applied Research Laboratories, University of Texas, Austin, TX; Washington Analytical Services Center (EG&G), Rockville, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Shipborne Minehunting System work was started in 1973-74 with studies and tests to determine parameters of system. A 1/3 scale towed body was produced and tank-tested in 1974-75 to determine hydrodynamic stability and pay load characteristics. Preliminary working models of competing sonar beamforming techniques were laboratory-tested and a phase shift technique selected. A sonar canister was pressure tested at operating depths in FY 1977. A developmental model of an ahead looking sonar was sea tested against mine targets in FY 1978. Laboratory testing of the volume search sonar subsystem of the Sonar Minehunting System was continued in FY 1979. The Shipborne Minehunting System development was redirected due to the selection of a smaller (1040 ton) MCM 1 Class mine countermeasures ship. The smaller variable depth minehunting sonar resulting from this redirection is called the Advanced Minehunting Sonar System. In 1981, A Rapid Development Capability designation was approved by SECNAV and a request for proposal was issued to industry for a concept design phase in the development of the Advanced Minehunting Sonar System. A near term data collection program was instituted by the government to obtain and assemble test data to assist industry with the design and to assist the government with the selection of the full scale engineering development contractor.

2. (U) FY 1982 Program: Complete concept design phase and select a contractor to develop the Advanced Minehunting Sonar System engineering development hardware. Continue government tests and data collection in areas such as bottom reverberation to assist with engineering development model design and development.

3. (U) FY 1983 Planned Program: Contractor will continue development of Advanced Minehunting Sonar System. Conduct preliminary and critical design reviews and commence fabrication of hardware. Government will continue tests and data collection to assist with development.

4. (U) FY 1984 Planned Program: Complete [ ] Government will complete near term test and data collection and continue far term work to obtain data for pre-planned product improvement effort.

5. (U) Program to Completion: [ ]

Project: S0260
Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Advanced Minehunting Sonar System
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0260	Advanced Minehunting Sonar System	*9,818	12,010	15,714	14,948	Continuing	Continuing

* In FY 1981, the Mine Neutralization System development was included under Project S0260. Actual Advanced Minehunting Sonar project funding was 500.

Project: S0262
Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Influence Mine Countermeasures
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The United States Navy [redacted] Two systems have been proposed. The Hydrofoil Pressure/Acoustic/Magnetic (HYPAM) Sweep System consists of acoustic and magnetic minesweeping equipment mounted on a PHM class hydrofoil with the foils providing the pressure signature a safe distance astern. This system will give the U.S. Navy [redacted] and represents a major improvement in current minesweeping capabilities. This system will be ready for deployment in the [redacted] The Explosive Resistant Multi-Influence Sweep System is a joint development effort under the aegis of NATO Naval Armaments Group Project Group 14 with design, development, testing and cost divided among five participating nations. This system exposes to direct mine explosions a special design, soft-hulled ship with on-board equipment for generating the acoustic/magnetic influences necessary to detonate sea mines. The Explosive Resistant Multi-Influence Sweep System is planned to be fully operational [redacted]

(U) RELATED ACTIVITIES: Program Element 63260N, Airborne Mine Countermeasures is developing magnetic and acoustic minesweeping systems which provide a technology base for acoustic/magnetic minesweeping systems.

(U) WORK PERFORMED BY: In-House: U.S. Army Mobile Electrical Laboratory, Ft. Belvoir, VA; Naval Weapons Center, White Oak, MD; Naval Coastal Systems Center, Panama City, FL; David W. Taylor Naval Research and Development Center, Bethesda, MD, and Annapolis, MD; Hydrofoil Experimental Unit, Puget Sound, WA. Contractors: Science and Management Resources, Inc., Arlington, VA; AMAF, Columbia, MD; Maxfield Associates, Alexandria, VA; Sperry Marine, Charlottesville, VA; Boeing Marine, Seattle, WA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Hydrofoil Pressure/Acoustic/Magnetic Sweep System- (1) Completed pressure, acoustic, magnetic ranging of PHM. (2) Completed assembly of test magnetic power unit. (3) Completed hi-speed test of towed gear. (4) Completed formation ranging of PCH, AGEH, and Jet Boat. (5) Completed feasibility study of using the PHM as a pressure, acoustic, magnetic minesweeper. (6) Started procurement package for three Hydrofoil Pressure/Acoustic/Magnetic Sweep System Engineering Development Models. Explosive Resistant Multi-Influence Sweep System- (1) Under the aegis of NATO Naval Armaments Group Project Group 14, completed Memorandum of Understanding (MOU) with four other participating nations: France, Germany, the Netherlands and the United Kingdom for feasibility demonstration phase. (2) Completed selection and preliminary design of propulsion system. (3) Completed working draft of Memorandum of Understanding for Phase III, Engineering Development and started negotiations. (4) Provided assistant program manager and other required expertise to Explosive Resistant Multi-Influence Sweep System Program Office (Koblenz, Germany). (5) Awarded contracts for rubber products study, underwater explosion testing, a mine/ship interaction study, a surface phenomenon effects study, fabrication of rubber hull sections and rubber diaphragms.

Project: S0262 — Title: Influence Mine Countermeasures
Program Element: 63502N — Title: Surface Mine Countermeasures
DoD Mission Area: 234 - Mine Warfare — Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Hydrofoil Pressure/Acoustic/Magnetic Sweep System - (1) Complete engineering tow tests on prospective acoustic and magnetic towed minesweeping systems utilizing PCH as a test craft. (2) Complete engineering and configuration tests on Magnetic Minesweeping System. (3) Select minesweeping systems. (4) Award contract for engineering development models. Explosive Resistant Multi-Influence Sweep System - (1) Complete explosive tests on hull test section. (2) Complete negotiations and obtain United States approval for Memorandum of Understanding for Phase III (Engineering Development). Continue suport to Explosive Resistant Multi-Influence Sweep System Program Office (Koblenz, Germany). (3) Participate in NATO Naval Armaments Group Project Group 14.

3. (U) FY 1983 Planned Program: Influence Mine Countermeasures development transitions to full scale engineering development under Program Element 64576N, Influence Mine Countermeasures.

4. (U) FY 1984 Planned Program: Full scale engineering development under Program Element 64576N, Influence Mine Countermeasures.

5. (U) Program to Completion: Full scale engineering development under Program Element 64576N, Influence Mine Countermeasures.

6. (U) Milestones: Hydrofoil, Pressure, Acoustic Magnetic Sweep System and Explosive Resistant Multi-Influence Sweep System Milestone II decisions, Milestone II decision 4th quarter FY 1982; Milestone III decisions to be determined.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0262	Influence Mine Countermeasures	2,141	8,215	*	*	*	*

*Engineering development under Program Element 64576N, Influence Mine Countermeasures.

Project: S1233
Program Element: 63502N
DoD Mission Areas: 234 - Mine Warfare

Title: Mine Countermeasures Improvements
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Work performed under the Mine Countermeasures Improvements Program will modify, adapt or improve the capability of certain systems as follows: (1) Modify and adapt the airborne AN/ALQ-141 countermeasures set for surface ship use. A surface ship version (ALFA TWO) of the AN/ALQ-141 will provide the Navy a special purpose deep water sweep capability. There is insufficient platform support for helicopters to also sweep many deep water mine countermeasure mission areas. Therefore, ship-towed ALFA TWO acoustic sweep systems will be used for influence minesweeping in these areas. (2) Improve depth performance of the AN/SQQ-14 variable depth minehunting sonar. Modifications to the AN/SQQ-14 Minehunting Sonar will provide greater vertical discrimination and increased depth of search capability from [ ] and improve display features. These improvements are needed to better cope with an emerging deep water mine threat. (3) Improve the mine countermeasure ship navigation system. Integrate standard navigation systems into the AN/SSN-2, Precise Integrated Navigation System. This system provides for safer, better coordinated surface mine countermeasure ship navigation, especially in hazardous, mined waters. (4) Improve current deep-moored sweep capability. The current Improved Deep Moored Sweep system [ ] thereby freeing vauable mine countermeasures' assets for other critical missions. Additionally, the Single Ship Deep Moored Sweep provides a [ ] capability. This will provide for more efficient sweeping of mines tethered close to the bottom. Since the present MSO's will be in commission until the late 1980's, improvements to the equipment on these ships may also be required to be supported under this project.

(U) RELATED ACTIVITIES: The AN/ALQ-141 Countermeasures Set (developed under Program Element 63260N, Airborne Mine Countermeasures, Project WO529, Airborne Minehunting System) serves as a model for a shipborne version of the equipment, the ALFA TWO Countermeasures Set. The Single Ship Deep Moored Sweep will utilize technology and some hardware developed by the Naval Air Systems Command under the Controlled Depth/Rapid Deploy Moored Sweep task in Program Element 63260N, Airborne Mine Countermeasures, Project WO528, Advanced Airborne Mine Countermeasures Equipment.

(U) WORK PERFORMED BY: In-House: Lead Laboratories - Naval Coastal Systems Center, Panama City, FL; Naval Ocean Systems Center, San Diego, CA, and David W. Taylor Naval Ship Research and Development Center, Bethesda, MD. Contractors: General Electric Co., Syracuse, NY; Washington Analytical Services Center, Inc., Rockville, MD; Magnavox Inc., Torrance, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A feasibility study conducted in late FY 1976 and FY 1977 under the Navy Science Assistance Program concluded that surface towing of the AN/ALQ-141 Countermeasures Set system was feasible. At-sea tests during 1977 demonstrated that no significant deterioration in system capability resulted from surface ship towing and operating. However, engineering changes are required to ensure compatibility with surface ship specifications, primarily in the areas of reliability, shock and vibration and Electromagnetic Interference. The ALFA TWO operational requirement was issued in FY 1979.

Project: S1233
Program Element: 63502N
DoD Mission Areas: 234 - Mine Warfare

Title: Mine Countermeasures Improvements
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

Draft specifications were completed FY 1980. The ALFA TWO System definition was completed in FY 1981. Automatic depth-control components applicable to the Single Ship Deep Moored Sweep have been developed for the Controlled Depth Rapid Deploy Moored Sweep System. These components have been analyzed for the Single Ship Deep Moored Sweep application. The Single Ship Deep Moored Sweep operational requirement was approved in FY 1979. It is planned that this project will be a joint development under the aegis of NATO Naval Armaments Group Project Group 22. AN/SQQ-30 Minehunting Sonar feasibility tests of deep modified AN/SQQ-14 Sonar were conducted aboard the USS FIDELITY (MSO-443) in late 1974 at the Ft. Lauderdale Test Range. Test results indicated feasibility of detecting deeper mines using the improved sonar with a longer tow-cable. In April 1978, a contract was awarded to General Electric Company to provide a pilot production system designated AN/SQQ-30. Design and fabrication of the AN/SQQ-30 was completed and the model installed on the USS FIDELITY in August 1980 for use in technical and operational evaluation. The technical and operational evaluation was completed in July 1981. Feasibility model tests of a partial AN/SSN-2 system were conducted onboard the USS PLUCK (MSO-464) leading to development of a procurement specification in FY 1975. In FY 1977 a contract was awarded for an advanced development model of a Precise Integrated Navigation system (AN/SSN-2). Hardware developed under this contract was delivered, installed and successfully tested on the USS PLUCK. In FY 1981, a contract was awarded to Magnavox, and fabrication of two AN/SSN-2 Precise Integrated Navigation System development models commenced.

2. (U) FY 1982 Program: ALFA TWO - Award full scale engineering development contract. AN/SQQ-30 Minehunting Sonar, obtain approval for service use and award a contract for refurbishment of two AN/SQQ-30 sonar engineering development models: one for installation on the lead MCM 1 Class mine countermeasures ship and one for use as a trainer and test bed for product improvements. AN/SSN-2 Precise Integrated Navigation System - Complete fabrication of engineering development models: One model will be installed in USS PLUCK (MSO 0464) for use in technical evaluation which will begin in late FY 1982, the other will be utilized for environmental testing. Single Ship Deep Moored Sweep - Complete specification and award contract for design and fabrication of engineering development model hardware.

3. (U) FY 1983 Planned Program: ALFA TWO - Complete design and drawings and begin fabrication. AN/SSN-2 Navigation System - Complete technical and operational evaluation. Approval for service use is planned for July 1983. Refurbishment will begin of the AN/SSN-2 engineering development models, one for installation on the MCM 1 Class mine countermeasures class ship, the other to be delivered as a trainer. AN/SQQ-30 Minehunting Sonar - Procure systems for the MCM ship program. Modify system as necessary to insure compatibility with other systems on MCM ship. Single Ship Deep Moored Sweep - Fabricate critical components, and begin component testing.

4. (U) FY 1984 Planned Program: ALFA TWO Countermeasures Set - complete fabrication. AN/SQQ-30 Minehunting Sonar - procure hardware for MCM-1 class ships. AN/SSN-2 Precise Integrated Navigation System - Deliver refurbished and modified engineering development model system, one for use as a trainer and the other to install on the MCM-1. Single Ship Deep Moored Sweep - Complete component testing and begin system fabrication.

Project: S1233
Program Element: 63502N
DoD Mission Areas: 234 - Mine Warfare

Title: Mine Countermeasures Improvements
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: ALFA TWO - Conduct environmental testing and technical and operational evaluation in [ ] with approval for service use in [ ]. Begin production in FY 1987 with Initial Operational Capability in [ ]. AN/SQQ-30 Minehunting Sonar - Deliver production units for installation on MCM 1 Class mine countermeasures ship and trainer in FY 1984. Continue to procure AN/SQQ-30s for follow-on MCM ships. AN/SSN-2 Navigation System - Install refurbished engineering development model system on MCM-1. Procure production hardware for follow-on MCM ships. Single Ship Deep Sweep - Reliability and environmental testing, and technical and operational evaluation will be completed [ ]. Approval for service use in FY 1986. Production will begin in FY 1987 to ensure an Initial Operational Capability in [ ].

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1233	Mine Countermeasures Improvements	8,288	9,350	9,640	7,932	Continuing	Continuing

Project: S1404 Title: Mine Neutralization System
Program Element: 63502N Title: Surface Mine Countermeasures
DoD Mission Area: 234 - Mine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project will develop a surface ship mine neutralization capability which will enable surface combatants, submarines, amphibious force ships and logistics support ships to operate with relative safety in deep and shallow mineable water areas in support of the Navy's sea control and projection missions. The Mine Neutralization System will provide the capability to neutralize sophisticated deep-water mines and other bottom and moored sea mines which cannot be neutralized by influence sweeping. This system is needed to fill a present [ ] that threat analysis project would be necessary to meet an aggressive Soviet mining campaign. As the use of Explosive Ordnance Disposal divers for deep [ ] water mine neutralization is not practical, [ ]

The Single Ship Deep Moored Sweep, however, [ ] The Mine Neutralization System consists of an unmanned, underwater vehicle equipped with a short range high resolution sonar, an underwater television system, and an electric/hydraulic propulsion system powered from the ship's electrical supply via a power/control cable. The Mine Neutralization System will be operable from the present ocean minesweepers or new mine countermeasures ships. The ship's minehunting sonar will be used to detect and classify mines moored in the water column or resting on the bottom. When a mine has been detected by the AN/SQQ-30 Sonar (or Advanced Minehunting Sonar System), [ ] The Mine Neutralization System will be capable of attaching a cable cutter on the mine mooring, or dispensing a [ ] explosive charge in close proximity to mines resting on the bottom. A prototype Mine Neutralization System was produced during the advanced development phase for development, test and evaluation. Two Mine Neutralization Vehicles are being produced during full scale engineering development: one which will undergo environmental testing and the other operational evaluation. The Mine Neutralization System will provide a capability to neutralize both bottom mines and deep moored mines. [ ]

(U) RELATED ACTIVITIES: Cable technology developed under Program Element 63713N, Ocean Engineering Technology Development; Project S0397, Deep Ocean Technology, is being used in the design of the cable for the Mine Neutralization Vehicle System. A variant of the AN/WQS-1 Sonar developed under Program Element 63722N, Naval Special Warfare, Project S0417, Swimmer Support System, is being used in the Mine Neutralization Vehicle.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, White Oak, Silver Spring, MD; and Naval Coastal Systems Center, Panama City, FL. Contractors: Honeywell Marine Systems, Seattle, WA; Washington Analytical Services Center, Inc., Rockville, MD.

Project: S1404
Program Element: 63502N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Neutralization System
Title: Surface Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Prior to FY 1982, both the Advanced Minehunting Sonar and Mine Neutralization Systems were within the SO260 line. That project originated in June 1972. Design of the Mine Neutralization System was completed in FY 1973 and fabrication of the advanced development model completed in FY 1975. The advanced development model Mine Neutralization System installed in USS FIDELITY (MSO-443) was tested successfully [redacted] feet in FY 1977. Contract for two full scale development models of the Mine Neutralization System were awarded to Honeywell Marine Systems in FY 1978. Design and fabrication have been completed. Tests of the Mine Neutralization System bomblet against live mines were conducted successfully in FY 1978. Drafting of test plans for the mine neutralization system technical/operational evaluation was begun.

2. (U) FY 1982 Program: The Mine Neutralization System Engineering Development Model fabrication is completed and the models are undergoing at sea testing in Puget Sound. Installation has begun of one model aboard the USS FIDELITY (MSO-443) for use in technical and operational evaluation. Shipboard installation will be completed, and technical and operational evaluation will occur and environmental testing on the other engineering development model will commence. A Mine Neutralization System variant for the smaller MSH 1 Class Coastal mine countermeasures ship vessel will be investigated.

3. (U) FY 1983 Planned Program: Obtain approval for service use in January 1983. Begin refurbishment of the engineering development models for installation of the new MCM-1 Class ship. Reduce magnetic signature of shipboard handling gear for enhancement of ship survivability.

4. (U) FY 84 Planned Program: Continue magnetic signature reduction of shipboard handling gear. Complete refurbishment of engineering development model and deliver to lead MCM 1 Class ship for installation. Award contract in FY 1984 for a trainer and the units to support the mine countermeasure ships being procured that fiscal year.

5. (U) Program to Completion: Continue deliveries of Mine Neutralization System to new construction mine countermeasures ships.

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1404	Mine Neutralization System	0	10,210	6,021	1,397	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63503N
DoD Mission Area: 345 - Tactical Communications

Title: Acoustic Communications (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,546	2,661	2,741	5,599	Continuing	Continuing
S0918	Acoustic Communications (Advanced)	3,546	2,661	2,741	5,599	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides advanced development of required long range low frequency [redacted] communication systems to support the future needs of nuclear attack submarines. A [redacted] communications array is being pursued which supports an Advanced [redacted] Project established between the Defense Advanced Research Projects Agency and the Navy.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Installation design of a partial transmitting array will continue. Additional transmitting components and associated electronics will be procured. Full scale baseline installation design will commence. This low frequency array development will combine with future array development for active sonar. Critical components life testing will continue in preparation for a sea test of a partial array on an attack submarine. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WTIH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive summary are as follows: The annual estimates for FY 1981, FY 1982 and FY 1983 have decreased by $31, $86 and $84, respectively, due to inflation adjustments.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,857	3,577	2,747	2,825	Continuing	Continuing
S0918	Acoustic Communications (Advanced)	2,857	3,577	2,747	2,825	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 63503N
DoD Mission Area: 345 - Tactical Communications

Title: Acoustic Communications (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Long range low frequency [ ] communication systems are needed to support attack submarine operations [ ]

(U) RELATED ACTIVITIES: The Acoustic Communications (Advanced) Program (Program Element 63503N) receives technology from various sources, including the transduction block (Program Element 62711N) and Command and Control Technology (Program Element 62721N). communications functions developed by Program Element 63503N will transition to either the Submarine Advanced Combat System (Program Element 64524N, Project S1347) or Acoustic Communications (Engineering) (Program Element 64566N). Transmitting and Receiving arrays for [ ] communications and other functions are planned for development under Program Element 63504N, Submarine Sonar Development (Advanced), for transitioning to the Large Aperture Sensor (S1305) Program during FY 1985.

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT (lead laboratory); Naval Ocean Systems Center, San Diego, CA. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Began systems engineering efforts to establish a Navy Acoustic [ ] communications baseline. This will aid in evaluation of future industry concepts and reduce risk. Commenced design of critical components. Transitioned long range call-up effort to engineering development in Program Element 64566N, Acoustic Communications (Engineering). Began preparation and partially completed technical data package for use in future competitive contracts. Defined an improved technique for hindsight reception. Defined communications waveforms for use in future combat systems. Continued the large array effort.

2. (U) FY 1982 Program: [Procure and test critical components necessary for a partial low frequency array sea test] This effort is part of the [ ] Project. This project will develop the transmitting portion of the sensor suite. A [ ] attack submarine communication receiver will be tested to validate waveform design.

3. (U) FY 1983 Planned Program: External transmitting array installation problems on an attack submarine will be addressed. Low frequency transducers from one and possibly two contractors will be tested in a lake. Partial transmitting array installation design will continue, as well as full-scale baseline design.

Program Element: 63503N
DoD Mission Area: 345 - Tactical Communications

Title: Acoustic Communications (Advanced)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Sea test a partial low frequency array on an attack submarine in order to demonstrate that a full-scale low-frequency array will satisfy future [redacted] requirements. Evaluate the [redacted] receiver at the same time. Transition critical components to Program Element 63504N, Project S1305-AS (Large Aperture Sensor), at the end of the fiscal year. The FY 1984 increase over the 1983 of $2,858 thousand reflects the requirement for dry docking to install the partial array on an attack submarine.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63504N
Title: Submarine Sonar Developments (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	35,031	45,523	18,371	20,034	Continuing	Continuing
S0222	Wide Aperture Array (Advanced)	15,383	24,383	0 1/ 2/	0 1/ 2/	(Continuing)	(Continuing) 1/ 2/
	(Wide Aperture Array)	(14,493)	(23,513)	(0) 1/	(0) 1/	(37,847) 1/	(160,414) 1/
	(Quantity-Wide Aperture Array Adv Development Model) 3/	(0)	(0)	(0)	(0)	(0)	(1) 3/
	(Low Ship Impact Ranging)	(890)	(870)	(0) 2/	(0) 2/	(Continuing) 2/	(Continuing) 2/
S0223	Submarine Sonar Systems Advanced Development	18,665	21,140	18,371	20,034	Continuing	Continuing
	(Sub-Tasks; Quantities)	(4/)	(4/)	(4/)	(4/)	(4/)	(4/)
S0970	Attack Submarine Federated Combat System Development	983	0	0	0	0	16,261

1/ The Wide Aperture Array sub-task transfers to Program Element 63590N in FY 1983. The advanced development total cost estimate shown applies to the completion of advanced development in the new Program Element.
2/ The Low Ship Impact Ranging sub-task transfers to project S1686 (Attack Submarine Combat Control System Improvements (Advanced)) of Program Element 63562N in FY 1983.
3/ Development/Operational Test and Evaluation. Procured prior to FY 1981.
4/ Refer to the Descriptive Summary for Project S0223 for Sub-Tasks and Test Item quantities.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides the advanced development and testing of improvements to present and future integrated sonar systems in order to maintain clear acoustic superiority over the high performance submarine and surface ship threat circa 1985-2020.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0222 Wide Aperture Array (Advanced): No FY 1983 funds are requested in this program element. Refer to the Descriptive Summaries for Program Elements 63590N and 63562N. S0223 (Submarine Sonar Systems Advanced Development): The Towed Array Improvement project will continue the data reduction of the [ ] sea-test data set and develop [ ] algorithms for a [ ] towed array. The Submarine Active Improvement project completes procurement of the Submarine Active Detection Sonar receiver subsystem advanced development model, completes Receive/Transit Subsystem/Optimum Mode Select/Post Processing Subsystem Integration and begins submarine modifications in overhaul. The Transient Acoustic processor program completes algorithm selection for Phase I Advanced Development Model and initiates

gram Element: 63504N
Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Developments (Advanced)
Budget Activity: 4 - Tactical Programs

se II. The decrease in funding from FY 1982 to FY 1983 is due to the transfer of the sub-tasks in project S0222, Wide Aperture ay (Advanced) as indicated in notes 1/ and 2/ of the funding profile. For S0223, which is a continuing program in this ment, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated ough FY 1984 only.

COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 2 Descriptive Summary and that shown in this Descriptive Summary are as follows: (1) FY 1983 and later funding for project 22 has been transferred to program elements 63590N, Wide Aperture Array (Adv), and 63562N, Submarine Tactical Warfare Systems v). (2) FY 1981 actual funding for the program element has decreased by 335 as the net result of changes in the Wide Aperture ay and Low Ship Impact Ranging Sub-Tasks (-148 in project S0222), partial compensation of the Submarine Sonar Advanced elopment program (Project S0223) for the reprogramming reported in the FY 1982 Descriptive Summary (+930) and reduction of the ack Submarine Federated Combat System Development program (Project S0970) to effect the above partial compensation and to vide support to the Submarine Advanced Combat System program (Program Element 63524N, project S1346) (-1,117). (3) The FY 1982 gram element total estimate has decreased by 1,030 due to revision (-537 and -493 in projects S0222 and S0223 respectively). The FY 1983 program element total estimate has decreased by 31,717 due to transfer of project S0222 as indicated by notes 1/ 2/ of the funding profile (-29,027), revision and reduction of FY 1983 activity in project S0223 (Submarine Sonar Advanced elopment) (-1,597) and delay of the planned starts of projects S1305 (Large Aperture Sensor) and S1306 (Multi-Function High quency Submarine Sonar) from FY 1983 to FY 1985 (-538 and -555 respectively). (5) The total estimated cost of the Attack marine Federated Combat System Development Program (project S0970) has changed by -1117 due to the above-mentioned compensating uction in project S0970. (6) The starts of the Large Aperture Sensor (S1305) and Multi-Function High Frequency Submarine Sonar 306) Programs have been slipped to FY 1985 and are therefore not shown. (7) The Aircraft Underwater Sound Experiment and Solid led Array sub-tasks discussed in the FY 1982 Descriptive Summary for project S0223 have been deleted, and two new sub-tasks led (Fiber Optic Sonar Link and _ ,detection/classification). (8) The name of project S0222 has been changed to e Aperture Array (Advanced).

FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

ject	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	28,245	35,366	46,553	50,088	Continuing	Continuing
22	Rapid Passive Localization Sonar	14,932	15,531	24,920	29,027	Continuing	Continuing
	(Wide Aperture Array)	(11,840)	(12,006)	(20,299)	(22,618)	(19,849)	(121,012)
	(Low Ship Impact Ranging)	(3,092)	(3,525)	(4,621)	(6,409)	Continuing	Continuing
23	Submarine Sonar System Advanced Development	7,546	17,735	21,633	19,968	Continuing	Continuing

Program Element: 63504N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Developments (Advanced)
Budget Activity: 4 - Tactical Programs

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
S0970	Attack Submarine Federated Combat System Development	5,767	2,100	0	0	0	17,378
S1305	Large Aperture Sensor	0	0	0	538	Continuing	Continuing
S1306	Multi-Function High Frequency Submarine Sonar	0	0	0	555	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63504N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Developments (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0222 Wide Aperture Array (Advanced): Operational Requirement, AS55, contains the applicable requirements. This program will develop a Wide Aperture Array sonar system for installation on SSN 688 and later design attack submarines and Low Ship Impact Ranging techniques [ ] Wide Aperture Array and Low Ship Impact Ranging will provide more accurate rapid passive ranging [ ] and, for Wide Aperture Array, will provide tracking [ ] to support accurate delivery of the MK-48 torpedo and tactical cruise missiles against a maneuvering target. Present fire control systems utilizing passive data require [ ] to generate a solution against an assumed non-maneuvering target. Wide Aperture Array and Low Ship Impact Ranging will also provide range information on [ ] either torpedo or threat platforms. Both Wide Aperture Array and Low Ship Impact Ranging will be capable of integration into the AN/BQQ-5 sonar or with a future combat system. The Wide Aperture Array and Low Ship Impact Ranging has been restructured from a Wide Aperture Array advanced development model integrated into the AN/BQQ-5 sonar to a stand-alone advanced development model to verify the external conformal array technology and associated ranging performance. One array (7 x 13 feet) and system electronics will be tested at Lake Seneca. Advanced development model electronics and six 7 x 13 feet arrays will be procured for development test/operational test Phase I sea testing. Low Ship Impact Ranging techniques [ ] are being developed to work from inputs of existing sonars and are complementary to the Wide Aperture Array system. They will also provide an upgraded capability to submarines which do not receive the Wide Aperture Array. S0223 (Submarine Sonar Systems Advanced Development): Designs for improvements to present and future integrated submarine sonar systems are developed and tested under this project in order to maintain clear acoustic superiority over high performance submarine and surface ship threats circa 1985-2020. Development of the following subsystem concepts are included in the program. Towed Array Improvements: Provides for the advanced development of improved [ ] passive detection, tracking localization, and classification capability of towed arrays. Provide for development of [ ] information needed for performance improvements. Provides for development of [ ] arrays for submarine use. Submarine Active Improvements: Provides [ ] increase over AN/BQQ-5 sonar active detection performance through [ ] Provides improved efficiency and greater power output and requires 13 fewer inboard cabinets than the equivalent function in the AN/BQQ-5, allowing space for future improvements. Transient Acoustic Processor: Exploits threat emitted transients received by attack submarine acoustic sensors. Improved [ ] Detection/Classification: Provides for the development of improved signal processing and post processing techniques to reduce operator loading and provides improved detection and classification with reduced space and weight requirements.]

Fiber Optic Sonar Link: Develop transmission techniques to transfer outboard fiber optic signals through the submarine hull. [ ] Initiate, validate and test techniques which will develop a [ ] classification capability or which will reduce tracker and detector thresholds. Interference Rejection Processing: Exploits techniques to minimize [ ] acoustic noise received on own platform arrays. S0970 (Attack Submarine Federated Combat System Development): In FY 1981, this program was restructured into the Submarine Advanced Combat System Development program under Program Element 63524N.

Program Element: 63504N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Developments (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: Full scale engineering development of the Wide Aperture Array will be conducted in Program Element 64520N (Wide Aperture Array (Engineering)), a planned FY 1985 new start. Program Element 64503N, Submarine Sonar Development (Engineering) provides the engineering development for other items transitioned from advanced development. Program Element 63562N, Submarine Tactical Warfare Systems (Advanced), project S1686, Attack Submarine Combat Control Systems Improvement (Advanced) will conduct advanced development of Low Ship Impact Ranging techniques in FY 1983 and later. Program Element 63503N, project S0918, Acoustic Communications (Advanced) - Requirements for communications must be accounted for in array development. Program Element 64562N, Submarine Tactical Warfare Systems (Engineering), project S0236, Attack Submarine Combat Control Systems Improvements (Engineering) - Incorporates some of the Low Ship Impact Ranging developments into Attack Submarine Fire Control. Program Element 62633N, Undersea Warfare Weaponry Technology - Performs the exploratory development for those items transitional to advanced development. Submarine Advanced Combat System, Program Element 64524N (FY 1982 start) - will provide the remaining advanced and engineering development of those items transitioned from advanced development and selected developments from this program element will be incorporated.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI; Naval Weapons Support Center, Crane, IN; and Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractors: EG&G Washington Analytical Services Center, Rockville, MD; RADIAN, Inc., Austin, TX; Sperry Rand, Great Neck, NY; General Dynamics, Electric Boat Division, Groton, CT; ENSCO, Springfield, VA; Raytheon, Submarine Signal Division, Portsmouth, RI; General Electric Co., Syracuse, NY; International Business Machines, Manassas, VA; Bolt, Beranek and Newman, Cambridge, MA; Analysis and Technology, No. Stonington, CT; Brunswick Corp., Costa Mesa, CA; H. I. Thomas Corporation, Gardena, CA. An additional 16 contractors are involved in minor developments or providing specific items to support the advanced development projects.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0222 Wide Aperture Array (Advanced): Project initiated in August 1971 and operational requirement AS55 promulgated June 1975 under the name "Rapid Acoustic Passive Localization". Defense Systems Acquisition Review Council I equivalent (Chief of Naval Operations Executive Board Review) held in December 1972. Authorization was granted to proceed into advanced development. Wide Aperture Array accomplishments: Contract awarded to Raytheon September, 1980, to procure electronics for Advanced Development Model sea test. Contract awarded to Brunswick Corp. March 1981 for 7 foot x 13 foot arrays for Lake Seneca tests and sea test. Contract awarded to H. I. Thomas Corporation August 1981 for compliant tube baffles for sea test. Factory acceptance test of Lake Seneca electronics completed July 1981. Analysis of similar electronics installation developed for the Royal Australian Navy and installed in USS BARB completed July 1981. Low Ship Impact Ranging accomplishments: Completed engineering change and product performance specifications for S0223 (Submarine Sonar Advanced Development): Project initiated in FY 1972 in response to Advanced Development Objective 23-26 dated 21 October 1971. The program has as its primary objective the development and test of promising subsystems for evolutionary building-block improvements to present and future integrated sonar systems. Each of these subsystems performance improvements is

intended to be integrated into the AN/BQQ-5A or later combat system as a replacement to an existing subsystem or to provide a supplemental capability where little or none previously existed. Preliminary milestone thresholds have been established and will be finalized when the subsystem has functionally demonstrated the degree of performance achievable and/or tactical application of applying these methods. Completed USS BAYA (AGSS-318) and USS HADDOCK (SSN 621) Wide Aperture Array (then under this project) sea test and data analysis and TR-317/TR-318 tranducer development to support improved submarine active sonar development. Completed the definition of improvements currently incorporated in the AN/BQQ-5A. Completed the definitions and preparation of the contract design package for the TRIDENT sonar which later evolved into the AN/BQQ-6. Completed the design, fabrication, and sea test of a Wide Aperture Array which led to a separate development program. Completed initial sea testing of towed array. Completed inital data reduction of towed array. Completed initial target motion analysis solution. Completed a critical towed array sea test. Delivered Submarine Active Detection Sonar transmit subsystem sea test hardware for integration. Completed initial threat classification compilation and completed sea tests with a brass board Transient Acoustic Processor. Defined areas of potential performance improvement. S0970 (Attack Submarine Federated Combat System Development Program: Initiated top-down performance analysis technique for submarine combat systems and concept development for a combat system for the 1990's design attack submarine. Program completed.

2. (U) FY 1982 Program: S0222 (Wide Aperture Array Advanced): Perform shock test on production compliant tube baffle segments and hydrophone assemblies. Install 7 foot x 13 foot array subsystem at Lake Seneca facility. Complete lake test. Complete advanced development model electronics assembly. Commence sea test installation design. Low Ship Impact Ranging: Conduct Development/Operational Test-I of ranging. Validate theoretical performance. S0223 (Submarine Sonar System Advanced Development): Towed Array Improvements: Complete ranging algorithm development. Continue sea test data reduction of towed array with inital array. Develop a towed array. Conduct sea tests. Continue data reduction and algorithm development for towed arrays. Submarine Active Improvements: Deliver Integrated Submarine Active Detection Sonar Advanced Development Model. Transient Acoustic Processor: Initiate Advanced Development Model development. Complete reduction of FY 1981 sea test data.

3. (U) FY 1983 Planned Program: S0222 (Wide Aperture Array (Advanced): Refer to the Descriptive Summaries for Program Elements 63562N and 63590N. S0223 (Submarine Sonar Systems Advanced Development): Towed Array Improvements: Continue sea test data reduction towed array using array algorithms under development. Continue data reduction of towed array for ranging. Fabricate and sea test the towed array. Continue algorithm development for towed array ranging. Submarine Active Improvements: Install Submarine Active Detection Sonar Advanced Development Model on Test Ship. Transient Acoustic Processor: Complete algorithm selection for Phase I Advanced Development Model. Initiate Phase II. Decrease in funding from FY 1982 to FY 1983 is due to overall moderate reduction in planned activity.

Program Element: 63504N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Developments (Advanced)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: S0222 (Wide Aperture Array (Advanced): Refer to the Descriptive Summaries for Program Elements 63562N and 63590N. S0223 (Submarine Sonar Systems Advanced Development): Towed Array Improvements: Complete data reduction of towed array. Continue sea test of towed array. Continue various ranging developments. Continue sea test data reduction and algorithm development for towed array development. Submarine Active Improvements: Complete sea test. Transient Acoustic Processor: Complete phase I system test and initiate transition to AN/BQQ-5 host system.

5. (U) Program to Completion: S0222 (Wide Aperture Array (Advanced):: Refer to the Descriptive Summaries for Program Elements 63562N and 63590N. S0223 (Submarine Sonar System Advanced Development): This is a continuing program. Each advanced development model will undergo Development Test I/Operational Test I prior to transitioning to full scale development as part of the AN/BQQ-5 system or a future combat system. The following projects are anticipated FY 1985 new starts: S1305 (Large Aperture Sensor): Provides for the advanced development of a large aperture sensor Substantial improvements in target tracking, detection and classification are expected. S1306 (Multi-Function High Frequency Submarine Sonar): Provides for advanced development of a high frequency sonar which will replace existing, unique equipments that have fulfilled the requirements for mine detection and avoidance, under-ice navigation, functions while saving space.

6. (U) Milestones:

	Milestones (Project S0222)		Date
1.	Complete Wide Aperture Array Flow Noise Tests		Apr 79
2.	Let Wide Aperture Array Lake Test Electronics Contract		Jul 79
3.	Conduct Low Ship Impact Ranging Sea Test		Nov 79
4.	Complete AN/BQG-Royal Australian Navy Sea Test		Apr 80
5.	Complete Array Shock Tests (Includes Hull Penetrators)		Sep 80
6.	Award Wide Aperture Array Advanced Development Model Electronic Contract		Sep 80
7.	Award Contract for seven 7 foot x 13 foot Arrays	(Feb 81)*	Mar 81
8.	Procure Skirt Baffles, Array Fairings & Compliant Tube Baffles	(May 81)*	Aug 81
9.	Complete Engineering Change and Product Performance Specification for Ranging Algorithms		May 81
10.	Shock Test Production Compliant Tube Baffle & Array Hydrophone Assemblies	(Jul 81)*	Mar 82
11.	Complete Development/Operational Test I	(Jul 81)*	Jan 82
12.	Complete CY 1981 Low Ship Impact Ranging Sea Tests		Dec 81
13.	Start Array Survivability Test		Dec 81
14.	Complete Lake Seneca Array/Electronic Test	(Apr 82)*	Sep 82

Program Element: 63504N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Developments (Advanced)
Budget Activity: 4 - Tactical Programs

*Dates shown in FY 1982 Descriptive Summary. Slip of shock test (10) and Lake Seneca array/electronics test (14) due to procurement delays for arrays (7) and compliant tube baffles (8). development/operational test I (11) slipped due to unavailability of test ship services. FY 1983 and later milestones for the Wide Aperture Array sub-task are shown in Descriptive Summary for Program Element 63590N.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63506N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Ship Torpedo Defense
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	2,447	5,281	Continuing	Continuing
80225	Surface Ship Torpedo Defense	0	0	2,447	5,281	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The capability of Soviet submarines and surface ships to employ anti-ship torpedoes presents a formidable threat to U.S. Navy surface ships. Additional torpedo defense equipment capable of detecting and countering torpedoes is required to improve ship survivability. The Surface Ship Torpedo Defense Program will include methods for countering the threat and consider differences in targeted ships' capabilities. The capability to detect and classify the torpedo will be given first priority in the Surface Ship Torpedo Defense Program because timely torpedo threat alertness is the key to achieving a high probability of countering the threat.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funds will provide the finalization of improvements to the AN/SLQ-25 Torpedo Countermeasure System (NIXIE) and the initiation of full-scale development [ ] As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: the decreases in funding in FY 1982 of 2,037 and FY 1983 of 615 are a result of a one year slip in starting the project.

Program Element: 63506N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Ship Torpedo Defense
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	2,037	3,062	Continuing	Continuing
S0225	Surface Ship Torpedo Defense	0	0	2,037	3,062	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	3,341	2,805	5,102	11,631	22,375	45,254
Quantity (AN/SLQ-25)	(14)	(14)	(26)	(52)	(87)	(193)

Program Element: 63506N Title: Surface Ship Torpedo Defense
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The current capability in the Fleet for torpedo defense consists of the use of the obsolete FANFARE (T-MK-6), its replacement NIXIE (AN/SLQ-25), and evasion tactics following torpedo detection by existing sonars on ASW ships. The Surface Ship Torpedo Defense Program evolved from the Ship Acoustic and Torpedo Countermeasures and Anti-Ship Torpedo Defense Projects. The objective of the Surface Ship Torpedo Defense Program is to develop modular, stand-alone equipment which can be developed and introduced independently, over a period of time, in affordable increments, and eventually provide surface ships the torpedo defense capability required. The Surface Ship Torpedo Defense Program consists of four separate items: a [ ] The development [ ] consists of two phases. One is for ASW ships and will utilize existing sonar sensors [ ] This equipment will [ ] The other phase addresses the sensor suite for non-ASW ships which will permit the use [ ] In addition, it will provide a means to [ ] The AN/SLQ-25 improvement program will afford the system better effectiveness against the current and projected acoustic torpedo threat. The [ ] The tactical alert is followed by [ ] Work is underway to define and determine the military utility and technical feasibility of [ ] The definition will identify capabilities currently existing or in development and recommend alternatives for future development.

(U) RELATED ACTIVITIES: The Surface Ship Sonar Modernization Program, Program Element 25623N, makes provisions for incorporation of [ ] software/hardware being developed by the Surface Ship Torpedo Defense Program. The Tactical Towed Array Sonar, (AN/SQR-19) Program, Program Element 64713N, could be used to increase detection/classification capabilities of the Surface Ship Torpedo Defense System. The ASW Combat System Integration Program, Program Element 25620N, can integrate the sensor and countermeasure systems. The Surface Ship Silencing Program, Program Element 63553N, Project S0229, is concerned with reducing ship-susceptibility to detection and hence reducing the likelihood of torpedo attack.

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Laboratory, Panama City, FL; Naval Underwater Systems Center, New London, CT. Contractors: Applied Research Laboratories, University of Texas, Austin, TX; Aerojet Electro Systems, Azusa, CA; Singer Librascope, Glendale, CA; Norden Systems/United Technologies, Melville, NY; Sperry Gyroscope, Great Neck, NY; Raytheon, Portsmouth, RI; RCA, Burlington, MA.

Program Element: 63506N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Ship Torpedo Defense
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The [ ] completed advanced development in FY 1979. Program not funded in FY 1980 or FY 1981.

2. (U) FY 1982 Program: Not funded.

3. (U) FY 1983 Planned Program: Commence engineering development [ ] for ASW capable ships. All experimental work has been performed and [ ] is ready for full-scale development. Competitive engineering development contracts will be awarded for [ ] engineering and detail design efforts. A contract will be awarded for improvements to the AN/SLQ-25.

4. (U) FY 1984 Planned Program: Engineering development will continue [ ] Improvements to the AN/SLQ-25 will continue.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63509N
DoD Mission Area: 238 - Other Naval Warfare

Title: New Ship Design
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	16,994	7,900	4,911	6,437	Continuing	Continuing
S0248	Shipboard Data Multiplex System	16,994	7,900	4,911	6,437	Continuing	Continuing
	Quantity	(DT&E/OT&E)					(2)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides for the development of techniques and systems to improve ship design and construction in terms of reducing schedule and cost, plus increasing flexibility and survivability. Shipboard Data Multiplex System is being developed as a general-purpose multiplex system for ships and submarines that could allow at least a ten-to-one reduction of point-to-point cabling. An advanced multiplex system to support high speed (10 Megabits per second or greater) computer-to-compter data transfer will be developed in the out-years. This system will be complementary to the general-purpose system. Benefits include reduced cost, increased information transfer capacity, improved ship system survivability, increased reliability and reduced ship and submarine construction time.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Engineering Development Model will be delivered, and the Maintainability Demonstration will be performed. Installation and check-out of the system on USS OLDENDORF (DD-972) will be completed. The Technical Evaluation of the system onboard the test ship will be accomplished. The primary reason for the $2,989 decrease of funding between FY 1982 and FY 1983 is that fabrication and most of the factory testing of the Engineering Development Model hardware is completed in FY 1982. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: an increase in FY 1981 of $7 and a decrease in FY 1982 of $100 result from adjustments during budget development. The addition of $4,911 in FY 1983 and $6,437 in FY 1984 results from having identified specific work required.

Program Element: 63509N
Title: New Ship Design
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12,120	16,987	8,000	TBD	Continuing	Continuing
S0248	Shipboard Data Multiplex System	12,120	16,987 (DT&E/OT&E)	8,000	TBD	Continuing	Continuing
	Quantity						(2)

(U) OTHER APPROPRIATONS FUNDS: Not Applicable

Program Element: 63509N
DoD Mission Area: 238 - Other Naval Warfare

Title: New Ship Design
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Current cabling and interconnection of shipboard electronics lacks flexibility to accommodate changes in electronic equipment to meet new threat situations, is vulnerable to battle damage, has low reliability, is degraded by electromagnetic interference, and is costly to install. Shipboard Data Multiplex System, a general-purpose data bus, could allow a significant reduction in the tens of miles of point-to-point cable and associated connectors and switchboards now required for low speed (1 Megabit per second) intercompartmental information transfer aboard ship. A High Speed Multiplex System will provide similar benefits for computer-to-computer data transfer. Evaluation of an Advanced Development Model indicated that Shipboard Data Multiplex System was ready for Full-Scale Development. A contract was awarded in FY 1978 for two Engineering Development Models, one to support environmental testing and the other to support Technical and Operational Evaluation. The High Speed Multiplex System development will proceed upon completion of the Shipboard Data Multiplex System test and evaluation.

(U) RELATED ACTIVITIES: Shipboard Data Multiplex System has been coordinated with related efforts through the basic Tri-Service Joint Tactical Communications program, Program Element 28010N. Shipboard Data Multiplex System is also supportive of efforts in Program Element 63568N, Combat System Architecture. It is planned that Shipboard Data Multiplex System will be compatible with recently-developed NATO Interface Standards (STANAGS 4153 and 4156). Exploratory Development work under Program Element 62721N, Command and Control Technology, is addressing the technology base related to advanced multiplexing systems.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (Lead Laboratory). Contractors: Rockwell International (Autonetics Group), Anaheim, CA; SEMCOR, Inc., Moorestown, NJ/San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Advanced Development Model was delivered to Navy in April 1976. Land-based Development Test and Evaluation and concurrent Initial Operational Test and Evaluation (OT-II) were conducted at Naval Ocean Systems Center, San Diego, CA. Results indicated that Shipboard Data Multiplex System was ready for Full-Scale Development. User interface standards were developed. A cost analysis of Shipboard Data Multiplex System use aboard a nuclear cruiser was completed and showed significant acquisition and installation cost savings ($9M) compared to conventional wiring. Design improvements identified during Development Test and Evaluation of the Advanced Development Model were fabricated, evaluated and incorporated in Engineering Development Model design requirements. The Shipboard Data Multiplex System Engineering Development Model applicability was extended to include, in addition to the dual-stage multiplex terminals for large ship applications, single-stage terminals for use on submarines, small ships and in low-signal density areas on large ships. Preliminary design studies for the application of Shipboard Data Multiplex System to the CG-47 class ship and the SSN-688 class submarine were completed. Concept Design for the DDGX application has been initiated. Full Scale Development contract (cost plus incentive fee) was awarded for two Engineering Development Models to support Test and Evaluation activities. The first Engineering Development Model (EDM-1) design,

am Element: 63509N
lission Area: 238 - Other Naval Warfare

Title: New Ship Design
Budget Activity: 4 - Tactical Programs

cation and breadboard testing were completed and performance testing was initiated. Fabrication of a second Engineering opment Model (EDM-2) was initiated.

U) FY 1982 Program: Test and evaluation planning will be conducted. Design of Shipboard Data Multiplex System for the DD- est ship installation will be completed to support Technical Evaluation and Operational Evaluation. Functional and interface ng for the DD-972 installation will be conducted. Fabrication of the second source will be completed. Qualification, onmental, and reliability testing ashore will be completed. Application engineering as applicable to specific user platforms quipment/systems will continue.

U) FY 1983 Planned Program: The two Engineering Development Models will be delivered and installation of an Engineering opment Model will be made in DD-972, the test ship for Technical and Operational Evaluation. Technical Evaluation will be cted. The maintainability demonstration and maintenance training will be performed, using the second Engineering Development l (EDM-2). In addition to installation and testing support, application engineering will continue for specific user orms, equipment and systems. System improvements will be initiated. The primary reason for the $2,989 decrease of funding en FY 1982 and FY 1983 is that fabrication and most of the factory testing of the Engineering Development Model hardware is eted in FY 1982.

U) FY 1984 Planned Program: Operational Evaluation will be completed and a request for Approval for Service Use will be tted. System support and integration will be provided for planned shipboard installations. System improvements will be ed as well as initial development of future data bus systems for specific requirements such as inter-computer channels.

J) Program to Completion: This program will continue to provide system improvements, shipboard integration, as well as, opment of data busses to meet future requirements.

J) Milestones: Not applicable.

FY 1983 RDT&E,N DESCRIPTIVE SUMMARY

Program Element: 63513N
Title: Shipboard Systems Component Development
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Warfare

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,124	8,142	15,452	13,710	Continuing	Continuing
S0382	Shipboard Auxiliary Systems Development	5,124	7,663	14,355	5,577	Continuing	Continuing
S1417	Shipboard Corrosion Control	0	479	1,097	2,092	Continuing	Continuing
S1589	Improved Electric Distribution Components	0	0	0	4,183	Continuing	Continuing
S1590	Critical Hull, Mechanical and Electrical Components	0	0	0	1,858	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops machinery subsystems and components for new ships and in some instances for backfit into the present fleet. S0382, Shipboard Auxiliary Systems Development: Develop shipboard auxiliary systems to provide fleet with standardized/modularized systems possessing improved effectiveness, reliability, maintainability, and significant life cycle cost, size, and weight savings. Development areas include high-efficiency potable-water production systems; single-screw rotary, oil-free air compressors; advanced-concept pumps; propulsion shaft seals, synthetic-based hydraulic fluids, advanced piping system components; and a variety of hull and deck machinery systems, electrical auxiliaries, and machinery control systems. S1417, Shipboard Corrosion Control: Develop production processes to improve life cycle costs of ships' components through improved corrosion and wear characteristics. These processes have or will have an existing technology base in the exploratory development area (technical feasibility) or in industry but have not demonstrated their full usefulness in production. S1589, Improved Electric Distribution Components: Develop advanced electrical components for near-future improvements in ship service electrical power systems. Principal thrusts are greater component survivability and maintainability, improved power continuity to vial loads and improved power-quality-compatibility between ship service power generation/distribution system and user equipments. Development areas include advanced circuit protection components, local management systems, power generation and power conditioning equipment. S1590, Critical Hull, Mechanical and Electrical Components: Develop improved equipments which are small but critical parts of shipboard hull, mechanical and electrical systems. Project includes many small component developments which are critical to hull, mechanical and electrical systems availability but which are not effectively supportable as separate budget line items. Components characteristic of this are valves, regulators, sensors, safety devices, switches, controllers, filters, small motors and coolant systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0382, Shipboard Auxiliary Systems Development - Continue development of 12000 gallon per day, reverse osmosis desalinator; family of 125 psi and 3000 psi single screw, oil-free, rotary air compressors; 35 psi Prairie Masker air compressor; variable-breadth-impeller fire pump; balanced rotor single screw fuel oil service pumps; centrifugal fuel oil purifier for high performance ships, hydraulic misalignment coupling, vertical package conveyors, ground

fault locator, sensors and data display system to facilitate close range ship control, e.g., during underway replenishment; and a general-purpose weapon elevator controller. Start development of auxiliary machinery condition monitoring equipment and an advanced-design, integrated, shipboard tank level indicator system. Continue development of electric auxiliaries for DD-963 Class ships. S1417, Shipboard Corrosion Control: Complete non-skid specification and prototype shipboard wire-sprayed aluminum facilities. Continue corrosion control handbook. Initiate task on metallized non-skid repair, hull preservation, bilge coatings, bilge coating quality assurance metallized-coating-repair quality assurance, and chemical surface preparation processes. S1589, Improved Electronic Distribution Components: New start in FY 1984. S1590, Critical Hull, Mechanical and Electrical Components: New start in FY 1984.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The increase of $262 in FY 1981 for Project S0382, Shipboard Auxiliary Systems Development, provided additional funds for development of a 9,600 gallon per day vapor compression distilling plant and associated control equipment required for correction of a critical maintenance problem with waste heat boilers in the DD-963 Class ships. The $200 decrease in FY 1982 was due to refinements in cost estimates. In Project S1417, the $20 decrease in FY 1982 is due to refinements in cost estimates. Funding is now shown for FY 1983 instead of TBD as shown in the descriptive summary for FY 1982.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,325	4,862	8,362	TBD	TBD	TBD
S0382	Shipboard Auxiliary Systems Development	2,423	4,862	7,863	TBD	TBD	TBD
S0383	Electric Power Systems (Solid State Equip)	3,902	0	0	TBD	TBD	TBD
S1417	Shipboard Corrosion Control	0	0	499	TBD	TBD	TBD

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 63513N
Dod Mission Area: 238 - Other Naval Warfare

Title: Shipboard System Component Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0382, Shipboard Auxiliary Systems Development - Project supports shipboard auxiliary component and system developments including compressed air and fresh water production systems, advanced pumps, hydraulic systems, electric and propulsion auxiliaries, advanced piping systems, hull and deck machinery, sensors and controls for ship systems. Emphasis is on developing auxiliary machinery which will not only provide improved performance effectiveness, reliability and maintainability, but will also result in size, weight and/or life cycle cost savings. A major technical thrust is to develop standardized modular designs, using the latest available equipment design concepts and structural materials. Representative of the type of items under development in this project are a reverse osmosis desalinator which is significantly less in volume and weight than a conventional plant and can produce twice as much fresh water; a highly reliable low-pressure, water-flooded, screw-type air compressor which is less than one-half the volume and weight of the conventional piston-type compressor now used aboard ships and requires less than one-half the number of parts for logistic support; a variable breadth impeller fire pump; an improved propulsion shaft seal; synthetic based hydraulic fluid; a centrifugal fuel oil purifier for high performance ships; a standardized advanced-design, general-purpose shipboard machinery controller using high-capability microprocessors and standard electronic modules which will reduce initial-design and logistic support costs in future shipboard machinery systems. This project includes development of electric auxiliaries for correcting critical problems associated with waste-heat-supplied steam systems in DD-963 Class ships and also includes completion of operational evaluation and approval-for-service use efforts on the Navy Standard Family 60/400 Hz Solid State Frequency Changers.

(U) S1417, Shipboard Corrosion Control - Many areas on ships, such as topside, machinery spaces, bilges, decks and wet spaces, are plagued with corrosion problems. These problems require an inordinate amount of labor from ship's force and other maintenance personnel. These problems are especially acute in new low-manned ships such as the DD-963 and FFG-7 Class ships. The Shipboard Corrosion Control Program will utilize results from completed exploratory development, promising new commercial developments and "off-the-shelf" items not previously used by the Navy, for immediate adaptation for fleet use for maintenance of old ships and construction of new ones. These developments include but are not limited to flame spray plasma spray, paints, ceramics, plastics, composites and engineering/design changes of components.

(U) S1589, Improved Electric Distribution Components - Develops advanced electrical components and equipments for improvements in ship service power systems. Sustainability of ship service electric power systems is limited by high shock sensitivity of electromechanical circuit breakers and switchboard systems, limited industrial production base for some critical components, excessive power interruptions to vital loads, major detrimental electrical interactions between ship power generation, distribution and utilization equipments which require large and expensive buffering devices and difficulty of upgrading to meet increasing power demands. This project is the primary Navy advanced development effort directed at improving the capabilities of these systems. The scope of equipment developments include power generation, conditioning, distribution and protection components. Principal thrusts are greater component survivability and maintainability, improved continuity of power to vital loads, and better inherent power-quality compatibility between generation/distribution systems and user equipments such as electronic loads in combat systems.

Program Element: 63513N
Dod Mission Area: 238 - Other Naval Warfare

Title: Shipboard System Component Development
Budget Activity: 4 - Tactical Programs

(U) S1590, Critical Hull, Mechanical and Electrical Components - Project supports development of improved components which are small but critical parts of shipboard hull, mechanical and electrical systems. Program includes many small components, each of which is critical to some hull, mechanical and electrical system performance, but for which development is not effectively supportable as a separate budget line item. Component areas characteristic of this situation include valves, regulators, sensors, indicators, safety devices, switches, small motors, filters, heat exchangers, coolant systems and many deck equipment items. Based on 3-M data, 19 of the top 20 fleet problems are in the area of hull, mechanical and electrical equipments and the above components are typical of the problem areas affecting availability of these hull, mechanical and electrical systems. Program emphasizes developments for near-future fleet applications and will be frequently reprioritized to be responsive to specific needs for improvements in component reliability and maintainability as identified in periodic fleet material readiness and hull, mechanical and electrical conferences.

(U) RELATED ACTIVITIES: Program Element 62543N, Ships, Submarines and Boats Technology (feasibility studies) and Program Element 62761N, Materials Technology, are the exploratory development efforts which will provide part of the basis for this program. Other portions will come from the civilian industrial community.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ship Systems Engineering Station, Philadelphia, PA; Naval Weapons Support Center, Crane, IN. Contractors: Varo Inc. Power Systems Division, Garland, TX; Gould Inc., Chesapeake Instruments Division, Glen Burnie, MD; Changler and Evans Inc., Hartford, CT; Crane Packing Co., Morton Grove, IL; Sealol Corp., Providence, RI; Karnylak Corp., Hamilton, OH; Norden Systems Inc., Norwalk, CT; MECO Corp., New Orleans, LA; Massachusetts Institute of Technology, Cambridge, MA; and others to be selected.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0382, Shipboard Auxiliary System Development - Project has produced a wide range of components/subsystems, such as: oil-free high pressure (3000 psi) piston-type air compressors; water-flooded, twin screw, rotary low pressure (125 psi) air compressor; wide range fuel oil burners; and a 25 man life raft desalination plant. Development has been initiated for a number of advanced concept auxiliary machinery system components in areas of high efficiency; potable and boiler feed quality water production; single screw oil-free air compressors; variable breadth and balanced rotor single screw pumps; propulsion shaft seals; synthetic hydraulic fluids; advanced piping system components and a variety of electrical auxiliaries and control-related subsystems. For fresh water production, two approaches are being pursued: a near-term vapor compression distillation system and a longer-range reverse osmosis desalination system. A non-militarized industrial-model 9600 gallon per day vapor compression distillation plant was fabricated and land-based evaluation started. Development was completed on an in-service citric-acid scale removal procedure for conventional low temperature distillers. Shipboard technical evaluation was completed on a 2000 gallons per day reverse osmosis desalination unit and test support provided for shipboard evaluation of a

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12,000 gallon per day non-military unit in DD-992. In the areas of air compressors, construction of the final stage of a oil-lubricated, single screw 3000 psi air compressor was completed and a water-lubricated version of this single stage was designed. Completed fabrication and started laboratory evaluation of a preprototype 2000 cubic feet per minute, 35 psi Prairie Masker twin screw air compressor. In the area of pumps: started laboratory evaluation of a preprototype titanium variable breadth impeller fire pump and initiated procurement actions for a prototype development. Completed laboratory evaluation of a preprototype balanced rotor single screw fuel oil service pump. Other prior accomplishments: completed laboratory evaluations of a baseline elastomeric seal, an alternative-design bellows type propulsion shaft seal, and polyalfa olefin synthetic-base hydraulic fluids for high pressure systems. Completed evaluation of rotary teleretry instrumentation. Completed laboratory and shipboard evaluation of brassboard-model ground fault detector and awarded contract for prototype systems. Awarded contract for ranging instrumentation of Underway Replenishment ship separation measurement. Completed land-based simulator tests on general purpose, shipboard elevator controller and started shipboard evaluation. Completed design and issued procurement solicitation for high-pressure misalignment coupling. Started development of synthetic fiber rope. Completed construction of Navy-standard design vertical package conveyor. Continued development of Navy-standard family 60/400 Hz frequency changers. Initiated development of electric auxiliaries for DD-963 Class ships.

2. (U) FY 1982 Program: S0382, Shipboard Auxiliary Systems Development - Continue shipboard evaluation of 12000 gallons per day industrial-model reverse osmosis desalination unit in USS FLETCHER DD-992 and award contract for design and construction of 12000 gallons per day mil-spec prototype unit for operational evaluation. Install preprototype 9600 gallons per day vapor compression distiller in USS THORN DD-988. Complete shipboard evaluation, and award contract for mil-spec prototype unit. Complete fabrication and initiate laboratory evaluation of 3000 psi single stage compressor and award contract for family of low and high pressure rotary, single screw, water lubricated air compressors. Complete laboratory evaluation of Prairie Masker air compressor. Award contract for titanium construction variable-breadth-impeller fire pump. Complete propulsion shaft seal laboratory evaluations and revise specifications. Complete land-based tests on vertical package conveyor and complete plans for shipboard installation. Complete shipboard evaluation of prototype solid state 60/400 Hz frequency changers and current-time sensing devices and obtain approval for service. Complete construction and initiate laboratory evaluation of prototype-model ground fault locator. Complete construction of sensors for test-model ship ranging instrumentation for close-range ship control. Continue shipboard technical evaluation of Standard Electronic Module shipboard elevator control system. Continue development of synthetic fiber marine rope. Continue development of electric auxiliaries for DD-963 Class ships. S1417, Shipboard Corrosion Control: New start in FY 1982. Initite development of non-skid coatings, corrosion control handbook and prototype shipboard wire-sprayed aluminum equipment.

3. (U) FY 1983 Planned Program: S0382, Shipboard Auxiliary System Developent - Complete ship evaluation of the industrial model reverse osmosis unit installed in DD-992 and complete fabrication of 12,000 gallons per day mil-spec unit for operational evaluation. Complete design and fabrication of low pressure, single screw prototype air compressor, and prepare specification for multi-stage 3000 psi water lubricated air compressor for operational evaluation. Complete fabrication and initiate laboratory

evaluation of prototype variable breadth impeller fire pump. Complete laboratory evaluation of balanced rotor single screw fuel oil service pump of cup-and-cylinder configuration and issue procurement solicitation for prototype unit. Complete initial laboratory tests on composite-material-constructed brine pumps. Initiate laboratory evaluation of candidate high pressure misalignment hydraulic couplings. Issue contract for design and initiate fabrication of lightweight fuel oil purifier for high performance ship applications. Complete ship installation and technical evaluation of Navy-standard design vertical package conveyor. Complete analysis of synthetic fiber rope and develop recommendations on new material/structural combinations for improved rope performance. Complete laboratory evaluation and start shipboard technical evaluation of ground fault locator for shipboard electrical distribution systems. Complete laboratory tests and start shipboard evaluation of experimental-model sensor system for close-range ship control during underway replenishment. Start development of integrated, shipboard tank level indicator system based on time domain reflectometer sensors. Start development of land-based test model condition monitoring/diagnostics/maintenance prediction system for shipboard air conditioning machinery. Start development of components for incorporating elevator machinery condition monitoring into the ongoing shipboard test of general purpose elevator controller. Continue development of electric auxiliaries for DD-963 Class ships. S1417, Shipboard Corrosion Control: Complete non-skid specification and prototype shipboard wire-sprayed aluminum facilities. Continue corrosion control handbook. Initiate task on metallized non-skid repair, hull preservation, bilge coatings, bilge coating quality assurance, metallized-coating-repair quality assurance, and chemical surface preparation processes.

4. (U) FY 1984 Planned Program: S0382, Shipboard Auxiliary System Development - Complete fabrication and initiate laboratory evaluation (performance, shock, vibration, etc.) of 12000 gallons per day military-specification reverse osmosis desalinator. Complete laboratory evaluation of low pressure single screw air compressor and design of prototype 3000 psi rotary air compressor. Complete design and construction of prototype Prairie Masker air compressor for ship operational evaluation. Complete laboratory evaluation of variable breadth fire pump and initiate installation for ship evaluation. Complete design and fabricate prototype single screw fuel oil service pump. Complete laboratory evaluation of high pressure misalignment hydraulic couplings and initiate shipboard operational evaluation. Complete fabrication of 25 gallons per minute, lightweight, fuel oil purifier. Complete shipboard evaluation of Navy-standard model vertical package conveyor. Continue development of synthetic fiber rope. Initiate development of advanced-design oxygen-nitrogen gas generation system for aircraft carrier and tender applications. Complete shipboard tests on display and sensor system for an experimental model close-range ship control system for underway replenishment. Complete construction of experimental-model integrated tank level indicator system and initiate laboratory evaluation. Complete design and start construction of air conditioning machinery monitoring system. Start shipboard technical evaluation of elevator machinery monitoring system. Start development of low-speed ship roll reduction system. Complete development of electric auxiliaries for DD963 Class ships. S1417, Shipboard Corrosion Control: Complete metallized coatings repair and specifications for non-skid deck coatings. Complete prototype wire-sprayed aluminum facilities, continue development of data sheets for the corrosion control handbook. S1589, Improved Electric Distribution Components - New start in FY 1984. Initiate development of advanced-design circuit protection components and improved load management system hardware incorporating solid-state switching devices. Award contracts to two or more electrical equipment manufacturers for competitive preliminary designs of prototype components for operational evaluation. S1590, Critical Hull, Mechanical and Electrical

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Components - New start in FY 1984. Develop priorities on component development starts based on latest fleet material readiness and hull, mechanical and electrical conferences. Initiate development of improved pump seals and bearings, sea water valves, steam valves, flush-deck-hatch boats and spindles and improved components for ship interior communication systems.

5. (U) Program to Completion: S0382, Shipboard Auxiliary System Development - This is a continuing program. Planned development completion dates for auxiliary system developments underway or planned are: FY 1985 - Variable-breadth impeller fire pump; single-screw, low-pressure air compressor; standard-electronic-module-built, microprocessor-based, general-purpose, machinery controller; wide-angle-displacement misalignment couplings for hydraulic systems; standard-model vertical package conveyor. FY 1986 - Centrifugal fuel purifier for high-performance ship applications; ship-service power ground fault locator system; composite-material-constructed overboard brine pump; rotary, oil-lubricated, Prairie Masker air compressor; synthetic fiber rope; reverse osmosis desalinator. FY 1987 - Rotary, single-screw, fuel oil service pump; rotary, oil-free, high pressure air compressor; shipboard elevator machinery condition monitoring system. FY 1988 - Advanced oxygen-nitrogen gas generation system, integrated tank level indicator system; close-range-ship-control system; low-speed ship roll reduction machinery. S1417, Shipboard Corrosion Control - Continue to incorporate corrosion control equipments, materials and techniques from exploratory development programs and new commercial developments into this advanced development program to reduce corrosion and wear of ships' components and to reduce life cycle costs. S1589, Improved Electric Distribution Components - Complete design, construction and test of prototype advanced circuit breakers and solid state bus transfer systems. Conduct operational evaluation in a land-based engineering facility and/or shipboard tests leading to approval for service use. Continue hardware developments of advanced power generation and conditioning components. This is a continuing program which is the primary Navy advanced development effort on shipboard electrical systems. S1590, Critical Hull, Mechanical and Electrical Components - This is a continuing project. Development of improved, small components for hull, mechanical and electrical systems will be continued in the areas of valves, pump seals and bearings, sensors, regulators, indicators, safety devices, filters, coolant systems, controllers, and small deck machinery components. Developments will typically progress from prototype development, acquisition of service use approval and formulation of technical data packages necessary for ship alterations or new-construction use of component developments.

6. (U) Milestones: N/A

Project: S0382
Program Element: 63513N
DoD Mission Area: 238 - Other Naval Warfare

Title: Shipboard Auxiliary Systems Development
Title: Shipboard Systems Component Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project develops shipboard auxiliary component and systems including compressed air and fresh water production systems, advanced pumps, hydraulic systems, propulsion and electric auxiliaries, hull and deck machinery, advanced piping systems, sensors and controls for ship and machinery systems. Emphasis is on developing auxiliary machinery which will not only improve performance reliability and maintainability, but will also result in size, weight and/or life cycle cost savings. A major technical thrust is to develop standardized modular designs, using the latest available equipment design concepts and structural materials. Representative of the type of auxiliary equipment items under development in this project are a reverse osmosis desalinator which is significantly less in volume and weight than a conventional plant and can produce twice as much fresh water; a highly reliable low-pressure, water-flooded, screw-type, air compressor which is less than one-half of the volume and weight of the conventional piston-type compressor now used aboard ships and requires less than one-half the number of parts for logistic support; a variable breadth impeller fire pump, an improved propulsion shaft seal; a synthetic based hydraulic fluid; a centrifugal fuel oil purifier for high performance ships; a standardized advanced design, general purpose shipboard machinery controller using high capability microprocessors and standard electronic modules which will reduce initial design and logistic support costs in future shipboard machinery systems.

(U) RELATED ACTIVITIES: Program Element 62543N, Ships, Submarines and Boats Technology (feasibility studies).

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Sea Systems Command, Washington, DC; Naval Avionics Facility, Indianapolis, IN. Contractors: Varo Incorporated, Power Systems Division, Garland, TX: Airesearch Manufacturing Company, Los Angeles, CA; Changler and Evans, Inc., Hartford, CT; Crane Packing Co., Morton Grove, IL; Chicago Pneumatic, Solon, OH; SERF, Pensacola, Fl; and others to be selected.

(U) PROGRAM ACCMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This project has provided the fleet with a wide range of improved auxiliary components/subsystems, such as: oil-free high pressure (3000 psi) pistcn type air compressors; water flooded, twin screw, rotary low pressure (125 psi) air compressor; wide range fuel oil burners; and a 25 man life raft desalination plant. Development has been initiated on a number of advanced concept auxiliary machinery system components in areas of high efficiency potable and boiler feed quality water production, single screw oil free air compressors; variable breadth and balanced rotor single screw pumps; propulsion shaft seals; synthetic hydraulic fluids; advanced piping system components and a variety of electrical auxiliaries and control related subsystems. Fresh Water Production: Development of two system concepts are continuing, viz., vapor compression distillation and reverse osmouis desalination. A non-Military Specification (industrial model) 9600 gallon per day vapor compression distillation plant was fabricated, land based evaluation was initiated and will be followed by installation

Project: S0382 Title: Shipboard Auxiliary Systems Development
Program Element: 63513N Title: Shipboard Systems Component Development
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in DD-988. Development was completed on an in-service citric acid scale removal procedure for conventional low temperature distillers. Shipboard technical evaluation was completed on a 2000 gallons perey reverse osmosis desalination unit and test support provided for the shipboard evaluation of a 12000 gallons per day, non-military unit in DD-992. Air Compressors: Completed fabrication of one stage of an oil lubricated 3000 psi single screw air compressor and completed preliminary design of a water lubricated version of this compressor stage. Fabricated and initited laboratory evaluation of a preprototype 2000 cubic feet per minute, 35 psi Prairie Masker twin screw air compressor. Advanced Pumps: Initiated laboratory evaluation of a preprototype titanium construction variable breadth impeller fire pump and requested contract negotiation authority for development of a prototype model. Completed laboratory evaluation of a preprototype balanced rotor single screw fuel oil service pump of the plate and cylinder configuration. Propulsion Shaft Seals: Completed laboratory evaluations of a baseline elastomeric seal and an alternative design bellows type propulsion shaft seal. Hydraulic Systems: Tests on polyalfa olefin synthetic base hydraulic fluids for high pressure systems have identified alternate synthetic hydraulic fluids in case of future foreign oil embargo. Completed design and issued procurement solicitation for development model high pressure misalignment couplings. Control Systems: Completed laboratory evaluation of rotating telemetry system for sensors on rotating machinery. Completed evaluation of a brassboard model ground fault detector and awarded contract for prototype system. Awarded contract for ranging instrumentation for close range ship separation measurement and started development of the controller algorithm. Completed land based simulator tests on general purpose, shipboard elevator controller and started shipboard evalution on CV 63 with a weapons elevator. Electric Auxiliaries: Continued reliability testing, shock tests, and shipboard operational evaluation of prototype model Navy standard family, solid state 60/400 Hz frequency changers which were initiated under previous Project S0383 of this Program Element. Hull and Deck Machinery: Designed and fabricated a Navy standard design vertical package conveyor. Started development of synthetic fiber rope.

2. (U) FY 1982 Program: Reverse Osmosis Desalination: Continue shipboard evaluation of 12000 gallons per day non-military unit in DD-992. Complete a multimedia filter evaluation for natural seawater operation and award contract for development of 12000 gallons per day military specification qualified prototype for operational evaluation. DD-963 Class Electric Auxiliaries Development: Install preprototype 9600 gallon per day vapor compression distiller in DD-988 and complete shipboard evaluation. Award contracts for development of military specification qualified vapor compression distiller, electric powered boiler and automatic 4-generator control systems. Air Compressors: Complete fabrication and initiate laboratory evaluation of single stage of water lubricated experimental model 3000 psi rotary air compressor. Award 4-phase contract for design, construction and factory test of family of low and high-pressure, prototype model, single screw, water lubricated air compressors. Complete laboratory evaluation of 35 psi, 2000 cubic feet per minute Prairie Masker air compressor. Advance Pumps: Award contract for developent of titanium construction, variable breadth impeller (VBI) fire pump. Complete laboratory performance evaluation of candidate actuating mechanisms for variable breadth impellers and initiate endurance tests. Initiate investigation of parallel operation of variable breadth impeller pumps. Propulsion Shaft Seals: Complete laboratory evaluations of modified elastomeric and rigid face seals and revise specifications. Hull and Deck Machinery: Complete land based tests on

Project: S0382 — Title: Shipboard Auxiliary Systems Development
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vertical package conveyor and develop plans for installation in USS MARS for shipboard evaluation. Investigate failure mechanisms in worn synthetic fiber rope. Analyze deformation modes and stress distributions during typical rope loading and during stress corrosion cracking and fatigue in rope deterioration. Electric Auxiliaries: Complete operational evaluation and obtain approval for service use for Navy standard family, solid-state, 60/400 Hz frequency changers. Controls: Complete construction of sensor for laboratory test model ship ranging instrumentation for close range ship control during underway replenishment. Continue shipboard technical evaluation of Standard Electronic Module shipboard elevator control system and complete environmental qualification tests. Complete construction of prototype model ship service power system ground fault locator and initiate laboratory evaluation.

3. (U) FY 1983 Planned Program: Reverse Osmosis Desalination: Complete ship evaluation of industrial model reverse osmosis unit installed in DD-992. Complete design and initiate fabrication of 12000 gallons per day military qualified reverse osmosis desalination system for operational evaluation. DD-963 Electric Auxiliaries Development: Initiate shipboard evaluation of prototyping system.. Air Compressors: Complete design and start fabrication of low pressure, single screw prototype water lubricated air compressor. Award contract for design and construction of prototype Prairie Masker air compressor for operational evaluation. Advanced Pumps: Complete fabrication and initiate laboratory evaluation of prototype variable breadth impeller fire pump. Complete fabrication and laboratory evaluation of balanced rotor single screw fuel oil service pump of cup cylinder configuration and issue procurement solicitation for design and fabrication of prototype pump. Complete laboratory tests on performance, mechanical, fatigue, shock and vibration characteristics of candidate composite material constructed brine pumps. Hydraulic Systems: Complete procurement and initiate laboratory evaluation of candidate high pressure misalignment hydraulic couplings. Propulsion Auxiliaries: Issue procurement solicitation for a lightweight, 25 gallon per minute centrifugal fuel purifier for high performance ships. Controls: Complete laboratory evaluation and start shipboard technical evaluation of prototype model ship service power ground fault locator. Complete laboratory tests and start shipboard test of experimental model sensor system for close range ship control during underway replenishment. Start development of integrated, shipboard tank level indicator system based on advanced design sensors. Start development of land based test model, condition monitoring system for shipboard air conditioning machinery. Start development of components for incorporating elevator machinery condition monitoring into a microprocessor based general purpose elevator controller. Hull and Deck Machinery: Complete ship installation and technical evaluation of a Navy standard design vertical package conveyor. Complete analyses on synthetic fiber rope and develop recommendations on new material/structural combinations which will enhance rope performance.

4. (U) FY 1984 Planned Program: Fresh Water Production: Complete fabrication and initiate laboratory evaluation (performance, shock, vibration, etc.) of 12000 gallons per day military qualified reverse osmosis desalinator. Air Compressors: Complete laboratory evaluation of low pressure single screw air compressor and start design of prototype 3000 psi rotary air compressor. Complete design and construction of prototype Prairie Masker air compressor for ship operational evaluation. Advanced Pumps: Complete laboratory evaluation of variable breadth fire pumps and initiate installation for ship evaluation. Complete design and

.roject: S0382 Title: Shipboard Auxiliary Systems Development
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fabricate prototype single screw fuel oil service pump. Hydraulic Systems: Complete laboratory evaluations of high pressure misalignment hydraulic couplings and initiate shipboard operational evaluation. Propulsion Auxiliaries: Complete fabrication of 25 gallons per minute fuel purifier. Deck Machinery: Complete shipboard operational evaluation of vertical package conveyor. Continue development of synthetic fiber rope. Controls: Complete shipboard tests on sensors and display system for experimental model close range ship control for underway replenishment. Complete construction of experimental model integrated tank level indicator system and start laboratory evaluation. Complete design and start construction of air conditioning machinery monitoring system for operational evaluation. Start shipboard technical evaluation of elevator machinery monitoring system. Complete shipboard evaluation of prototype model ship service power system ground fault locator. Start development of low speed ship roll reduction systems. Oxygen Nitrogen Systems: Initiate development of advanced oxygen nitrogen gas generating system for carrier and tender operation.

5. (U) Program to Completion: This is a continuing program. Planned development completion dates for the various shipboard auxiliary system developments underway or planned are: FY 1985: Variable breadth impeller fire pump, single screw, low pressure air compressor; standard electronic module constructed, microprocessor based machinery controller; wide angle displacement misalignment couplings for high pressure hydraulic systems; vertical package conveyer. FY 1986: Ship service power system ground fault locator; Centrifugal fuel purifier for lightweight ship applications; composite material constructed overboard brine pump; Rotary oil lubricated, low pressure Prairie Masker air compressor; synthetic fiber marine cordage; reverse osmosis desalinator; FY 1987: Rotary single screw fuel oil service pump; rotary oil free high pressure air compressor; Shipboard elevator machinery condition monitoring system. FY 1988: Advanced oxygen nitrogen gas generating system; Integrated tank level indicator system; Close range ship control sensor and display system; low speed ship roll reduction machinery.

6. (U) Milestones: N/A

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0382	Shipboard Auxiliary Systems Development	5,124	7,663	14,355	5,577	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63514N
DoD Mission Area: 238 - Other Naval Warfare
Title: Shipboard Damage Control
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	23,941	18,659	23,659	21,834	Continuing	Continuing
S0364	Submarine Damage Prevention	1,090	*	*	*	*	*
S0384	Ship Survivability	18,208	16,308	18,296	15,319	Continuing	Continuing
S1121	Personnel Protection	1,544	2,351	2,258	1,900	Continuing	Continuing
S1565	Ship Damage Control	0	0	2,911	3,344	Continuing	Continuing
W0592	Aircraft and Ordnance Safety	2,206	*	*	*	*	*
R1545	LINK MACE	893	0	194	0	Continuing	Continuing
S1607	EMPRESS II	0	0	0	1,271	Continuing	Continuing

Beginning with FY 1982, project S0364 is transferred to Program Element 63561N, Submarines (Advanced), and project W0592 is transferred to Program Element 63262N, Aircraft Survivability and Vulnerability. A new project R1545, LINK MACE was established for FY 1981.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops the improved equipment, systems and design specifications and standards required for the protection of ships and their embarked personnel from the effects of hostile actions or accidents pursuant to Public Law 95-485, Section 810, of 20 October 1978. Recent combat experience, peacetime disasters, and tests have highlighted the Navy's need to improve all areas of survivability. Survivability consists of the prevention, control, containment, and restoration of battle damage. The ability to sustain combat operations, following battle damage, is inherent in the concept of survivability.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Ship Survivability S0384: Complete the FY 1983 Ship Alteration package to provide improved protection for DD-963, CGN-36/38, LHA-1, CVN-68, LCC-19 and DDG-993 class combat systems. Initiate ship alteration package for CGN-36, and CGN-38 class (AEGIS and NON-AEGIS). These alterations are being installed during FY 1982 and subsequent regular overhauls or restricted availabilities. Continue damage control improvements. Continue backfit and forefit fix development to provide the technology base necessary to modernize the Navy with survivable ships in response to Public Law 95-485. Complete advanced development and transition to Engineering Development the hardened [redacted]

Program Element : 63514N
DoD Mission Area: 238 - Other Naval Warfare

Title: Shipboard Damage Control
Budget Activity: 4 - Tactical Programs

] Design and fabricate advanced development hardened missile fire control system. Initiate efforts for increased ship and combat system protection from nuclear weapons effects. Personnel Protection S1121: Develop protective clothing (battle dress) for use by shipboard personnel during combat. Ship Damage Control S1565: Develop improved damage control firefighting capability and personnel survival systems, and concepts to enhance fleet readiness and damage tolerance to provide options for configuration for damage control. Link Mace R1545: is a project whose details are classified beyond this document.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows:

(U) Project S0364, Submarine Damage Prevention -- FY 1981 reduction of $18 due to reduction in inflation. Project is transferred in FY 1982 to Program Element 63561N, Submarines (Advanced).

(U) Project S0384, Ship Survivability -- FY 1981 net reduction of $866 consisting of $900 which was transferred to project R1545, LINK MACE, and $34 which was an increase for escalation, FY 1982 funds were reduced by $308 due to restructuring of the proram. FY 1983 funds were reduced by $2,316 to help create a new project S1565 Ship Damage Control.

(U) Project S1121 Personnel Protection -- FY 1981 reduction of $61, FY 1982 reduction of $92 and FY 1983 reduction of $90 are due to adjusted inflation costs.

(U) Project W0592, Aircraft Ordnance and Safety -- FY 1982 funding rquirements transferred to Program Element 63262N, Aircraft Survivability and Vulnerability.

(U) Project R1545, LINK MACE -- Project established in FY 1981 for $900 which was reprogrammed from S0384 Ship Damage Prevention and Control and adjusted for inflation to $893.

(U) Project S1565, Ship Damage Control -- Project starts in FY 1983.

ogram Element: 63514N
D Mission Area: 238 - Other Naval Warfare

Title: Shipboard Damage Control
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) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

oject .	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	17,674	24,916	19,059	22,960	Continuing	Continuing
364	Submarine Damage Prevention	1,835	1,108	0	0	Continuing	Continuing
384	Ship Damage Prevention and Control	13,480	19,074	16,616	20,612	Continuing	Continuing
121	Peronnel Protection	847	1,605	2,443	2,348	Continuing	Continuing
592	Aircraft and Ordnance Safety	1,512	2,229	0	0	Continuing	Continuing
545	LINK MACE	0	900	0	0	Continuing	Continuing

) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63514N
DoD Mission Area: 238 - Other Naval Warfare

Title: Shipboard Damage Control
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program is aimed at improving damage control systems for submarines and ships plus improving aircraft survivability. There are four projects: S0364, Submarine Damage Prevention - This project addresses fire prevention, detection, containment, and extinguishment plus the development of damage control equipment and systems unique to submarines. S0384, Ship Survivability - This project develops technology and hardware that enhances (1) ship survivability (2) combat systems, hull, mechanical and electrical systems and ship structure survivabilty to all weapons effects, and (3) damage control and fire fighting capability of Naval Ships pursuant to Public Law 95-485, Section 810, of 20 October 1978. S1121, Personnel Protection - Development of shipboard protective battle dress and other improvements in personnel protection aboard ship commenced in FY 1980. W0592, Aircraft and Ordnance Safety - This project focuses on aircraft combat survivability, aircraft ordnance "cook-off" and flight/hangar deck conflagration control. Beginning with FY 1982, project S0364 is transferred to Program Element 63561N, Submarines (Advanced) and Project W0592 is transferred to Program Element 63262N, Aircraft Survivability and Vulnerability. A new project R1545, LINK MACE was established for FY 1981. S1565, Ship Damage Control - A new project, beginning in FY 1983 will develop technology and hardware that enhances damage control and fire fighting capability of Naval Ships pursuant to Public Law 95-485 Section 810 of 20 Oct 1978.

(U) RELATED ACTIVITIES: Ships, Submarines and Boats Technology, PE 62543N; Ship Development (Advanced), PE 63564N: Ship Development (Engineering), PE 64567N.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Surface Weapons Center, Dahlgren, VA; Naval Air Systems Command, Washington, DC; Naval Sea Systems Command, Washington, DC; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Clothing and Textile Research Facility, Natick, MA. Contractors: Scott Aviation, Lancaster, NY; Mine Safety Appliance, Pittsburgh, PA; George G. Sharp, Inc., Hyattsville, MD; Gibbs and Cox, Inc., New York, NY; Monsanto Research, Dayton, OH; Southwest Research Institute, San Antonio, TX; FMC/Northern Ordnance Division, Milwaukee, WI; Rockwell International, Pittsburgh, PA; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0364, Submarine Damage Prevention - Submarine Fire History report issued. Fire hazards associated with oxygen replenishment systems evaluated to determine detection and suppression system needs. A protective intumescent paint for hull insulation evaluated and recommended for shipboard use. Completed the engineering feasibility study of fire suppression through nitrogen pressurization. Provided storage criteria for chlorate candles. Determined the adequacy of ventilation for battery wells. Continued development of fire suppression techniques and agents for submarines such as thixogel, fine water mist and mini-twin agent unit. Developed protective clothing for submarine firefighters. Determine the relative hazards of materials used aboard submarines. Determined the life-support systems capacity to remove fire products. Initiated a

program to improve communications during a fire. Conducted large scale tests of nitrogen fire suppression, carbon bed fire detection and suppression system, oxygen generator fires, and chlorate candle fires. S0384, Ship Survivability - Developed Halon fire extinguishing system for machinery space applications. Completed technical evaluation and obtained Approval for Service Use of emergency escape breathing device. Developed refractory felt for fire protection of aluminum superstructures. Developed active fire protection systems for aluminum ship structures. Developed design requirements for improved fire and smoke detectors. Completed survivability assessment of DD-963 and CGN-36 Class ships and survivability military improvements approved by the Ship Acquisition and Improvement Panel. Continued assessments for LHA-1, CGN-38, CVN-68, LCC-19 and DD-993 and CGN-38 Class ships.

and initiated procurement of engineering developmental models. Completed vulnerability assessments and preliminary equipment. Completed development of equipment on DD-963 class ships. Completed development of Initiated development of aluminum structures. Developed damage resistant structural concepts for new ship designs. Continued Engineering Development Model prototypes of Complete definition for and initiated design of engineering development model prototypes. Completed design of prototypes Continued development of techniques. Initiated Engineering Development Model for magazine sprinkler controls. Tested injection pump as possible replacement for FP-180 proportioner. Tested MIL-SPEC Balanced Pressure Proportioner. Continue evaluation of smoke knockdown and fire extinguishing capabilities of fine water mist system. Completed evaluation of fire extinguishing techniques for shipboard cables. Initiated improvements in damage control communications, sound powered telephones and emergency alarm/announcing system. Secured approval of damage control party fire fighting clothing for service use. Developed carbon dioxide liquid level detector. Initiated studies in combustion toxicity of paints and cables. Conducted acceptance test of advanced fire detection system. Continued development of S1121, Personnel Protection - Development of shipboard battle dress pursued on basis of surveys, fleet inputs and modern protective technologies to develop concise defined parameters in support of a Navy-approved program. Protection components being developed are: Engineer Coveralls (Fire Retardant), Fire Retardant Shipboard Uniform, Phonetalker Helmet, General Purpose Battle Helmet, Life Vests, and Naval Body Armor/Flak Vest ensembles. Continued program to engineer, develop, optimize, test and obtain fleet concurrence for Naval Battle Dress: Fire Retardant Engineer's Coveralls, Fire Retardant Shipboard Uniforms, Phonetalker Battle Helmet, General Purpose Battle Helmet, New Life Vest Designs, and Naval Body Armor/Flak Vest ensembles. Completed Phonetalker Helmet Approval for Service Use. Managed engineering support of battle dress procurements and fleet support efforts. Provide logistical and technical support management. W0592, Aircraft and Ordnance Safety, - MK-80 Bomb series retrofit completed and produced significant increase in

resistance to "cook-off". Established criteria and conducted tests to evaluate [ ] Completed case-venting concept tests and evaluated heat path elimination techniques for various weapons. Conducted numerous missile rocket motor cook-off tests to evaluate project retrofit and advanced design fixes. Completed thermal analysis of in-service composite materials. Conducted tests to evaluate fire response characteristics of advanced composite materials. Continued investigation of extinguishing techniques to reduce composite fibre release hazard. Tested methods to extinguish titanium engine fires. Investigated advanced concepts to detect and extinquish fuel and composite fires. Conducted Shrike cook-off tests. Continued investigation of retrofit protective techniques for in-service air launched missile rocket motors and warheads. Continued advanced design concept investigations to reduce/eliminate cook-off hazards in advanced weapons.

2. (U) FY 1982 Program: Project S0364 is transferred to Program Element 63561N, Submarines (Advanced) and project W0592 is transferred to Program Element 63262N, Aircraft Survivability and Vulnerability. S0384, Ship Survivability - Complete survivability assessments for CVN-68, CGN-38, LHA-1, LCC-18 and DDG-993 class ships. Continue backfit and forward fit fix development of total ship systems to provide the technology base necessary to modernize the Navy with survivable ships in response to Public Law 95-485. Initiate ship and ordnance alteration survivability technology transfer packages for the CGN-36, CGN-38, LHA-1, LCC-18, and CVN-68 Ship Classes. Continue development of damage models for array antennas to improve fragment and blast vulnerability data and fixes for electronic components, antennas and ordnance. Continue Engineering Development/prototypes of [ ] Deliver first units of [ ] installations. Continue [ ] Continue design of prototype [ ] Continue development of [ ] Initiate redundant back up control systems consoles for combat systems and hull, mechanical and electrical systems. Continue development of [ ] Continue updating of vulnerability data on combat systems equipments, especially fragmentation data for ordnance components and blast effects on antenna structures. Complete Ship Acquisition Improvement Panel presentations for the LHA-1, LCC-19, CVN-68, CGN-38, AEGIS and initiate DDG-993 survivability assessment. S1121, Personnel Protection - Complete Approval for Service Use tasks for: Fire Retardant Shipboard Uniforms, New Life Vest Designs, and General Purpose Battle Helmet. Direct engineering, design, and development for Naval Battle Dress: Ballistic Face Shields for Helmets and Gas Masks, Ballistic Protective Fire Fighting Helmet, Neck-Throat-Hand Fragmentation and Burn Protection. Initiate explosives suit evaluation. Initiate 30 minute emergency escape breathing device. Initiate fleet operational assessment of Ballistic Face Shields, Flak Vests, Damage Control Suit & Enhanced Engineering Coveralls. Complete phase II of fleet evaluation of Fire Retardant Shipboard Uniforms. Continue development of Anti-exposure suit & commonality life vest. S1565, Ship Damage Control - Publish MIL-SPEC for shipboard fire detection system and begin acceptance tests on advanced development model of detection system. Complete prototype of magazine sprinkler system detection/actuation unit and prepare specification. Complete testing of eductor/nozzle combination as replacement for portable FP-180 fire pump and of injection pump as replacement for fixed FP-180. Install prototype balanced pressure Aequous Film Forming Foam proportioner on board ship (AVT-16). Construct prototype of fine water mist fire extinguishing system and test. Complete shipboard tests of wirefree, damage control communications system. Complete improvements

to Oxygen Breathing Apparatus voice amplifier and to sound powered telephone headset/chestplate. Complete operational and environmental tests of life raft desalination unit for making potable water.

3. (U) FY 1983 Planned Program: S0384, Ship Survivability - Complete Engineering Development and transition to Engineering Development [ ] Continue Engineering Development [ ] Complete shock hardening prototypes [ ] Continue updating combat system vulnerability data, initiating efforts on nuclear weapons effects. Design and fabricate advanced development hardened missile fire control system. [ ] project will be continued. Continue [ ] Initiate survivability enhancements for advanced fire control and guided missile systems. Continue development of [ ] super-structures. Continue development of redundant and backup control systems for combat, hull, mechancial and electrical systems. Continue fire protection and damage control systems equipment development. [ ] Work will continue on total ship systems development suitable as candidates for 6.4 (engineering development) R&D pre-production prototypes. Complete the Ship Acquistion Improvement Panel [ ] recommendations for DDG-993. Prototypes already developed will be transitioned into new Program Element 64516. S1121, Personnel Protection - Complete Approval for Service Use for Ballistic Face Shields, and Fire Fighting Helmets, direct engineering, design, and development for protective battle dress concepts. Manage engineering support of battle dress procurement and fleet support efforts. Provide logistical and technical support management. Continue evaluation of explosive suit. Continue development of 30-minute emergency escape breathing device. S1565, Ship Damage Control - In FY 1983, the fire protection and damage control tasks will be combined to form this new project. The new project will: Complete acceptance tests on fire detection system and conduct technical/operational evaluation of system. Conduct development tests of magazine sprinkler system detection/actuation unit. Complete testing of superconcentrated Aequous Film Forming Foam initiate work on proportioner for superconcentrated Aequous Film Forming Foam. Prepare MIL-SPEC for new multipurpose dry chemical fire extinguishing agent. Complete technical/operational evaluation of balanced pressure Aequous Film Forming Foam proportioner. Conduct shipboard test of water mist fire extinguishing system. Complete MIL SPEC for improved dry chemical fire extinguisher. Conduct full scale, shipboard demonstration of smoke knockdown device. Complete studies on reduction of flammability of shipboard electrical cables. Complete specification and obtain Approval for Service Use on life raft desalination unit.

4. (U) FY 1984 Planned Program: S0384, Ship Survivability - Continue [ ] and [ ] Continue development of [ ] Continue development of survivability engineering standards and procedures. Complete [ ] equipment. Continue updating ship system vulnerability data. Continue development of [ ] damage tolerant superstructures. Continue development of [ ] techniques. Complete a concept demonstration model of a redundant control system console for application to combat, hull, electrical and mechanical systems. Continue development of survivability enhancements for hull, mechanical and electrical systems. Conduct

Program Element: 63514N
DoD Mission Area: 238 - Other Naval Warfare

Title: Shipboard Damage Control
Budget Activity: 4 - Tactical Programs

ordnance and propulsion vulnerability investigation. Complete development of Combat Survivability requirements, standards and specification guidelines. Complete assessment, and prototype fabrication and evaluation for for Begin testing S1121, Personnel Protection - Complete approval for service use and Supply Request Package for Fire Retardant Shipboard Uniforms, Ballistic Face Shields, Flak Vests, Damage Control Suits & Enhanced Engineering Coveralls. Absorb and continue Chemical, Biological and Radiological protective clothing program, i.e. enhanced Chemical, Biological and Radiological suit development, complete enhanced boot & glove design, and initiate improvement modifications to MK-5 mask. Initiate assessment of Battle Dress equipment for Beachmasters, exposed amphibious and flight/hanger deck personnel. S1565, Ship Damage Control - Achieve Approval for Service Use for shipboard fire detection system. Install magazine sprinkler system detection/actuation unit aboard ship for evaluation. Complete development of proportioning system for superconcentrated Aequous Film Forming Foam. Complete MIL-SPEC for multipurpose dry chemical fire extinguishing agent. Complete development of fine water mist extinguishing system. Develop criteria for smoke and corrosive combustion products for shipboard electrical cables. S1607 EMPRESS II - A major design and development contract for the EMPRESS II facility will be initiated. It is planned to establish a separate program element for EMPRESS II to facilitate management considerations.

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

6. (U) Milestones: Not applicable.

Project: S0384
Program Element: 63514N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Survivability
Title: Shipboard Damage Control
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project continues the development of ship damage prevention and control but expands the scope to embrace Public Law 95-485, Section 810, of 20 October 1978 which requires a Navy shipbuilding policy that builds more survivable combat ships. Ship survivability encompasses active and passive protection, decoys and countermeasures, as well as force survivability. The thrust of this project is to bridge the gap between passive protection and force survivability.

(U) RELATED ACTIVITIES: Ships, Submarines and Boats Technology, PE 62543N.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Surface Weapons Center, Dahlgren, VA; Naval Sea Systems Command, Washington, DC; Naval Weapons Center, China Lake, CA; Naval Ship Engineering Center, Philadelphia, PA; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Ordnance Station, Louisville, KY. Contractors: Scott Aviation, Lancaster, NY; Mine Safety Appliance, Pittsburgh, PA; Monsanto Research, Dayton, OH; New Mexico Institute of Mining Technology, Sandia, NM; Stanford Research Institute, Palo Alto, CA; ARL, Inc., Washington, DC; Southwest Research Institute, San Antonio, TX; FMC/Northern Ordnance Division, Milwaukee, WI; Rockwell International, Pittsburgh, PA; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed improved communication device for Oxygen Breathing Apparatus. Developed Halon fire extinguishing system for machinery space applications and fire stop material for cable penetrations. Completed technical evaluation of emergency escape breathing device. Developed refractory felt for fire protection of aluminum superstructures. Developed an in-line eductor replacement for portable FP-180 foam proportioner. Developed active fire protection systems for aluminum ship structures. Developed design requirements for improved fire and smoke detector criteria for new ship designs. Completed survivability assessment of DD-963 and CGN-36 Class ships and initiated assessments for LHA-1, CVN-68, CGN-38 LCC-19 and DDG-993 Class ships. Developed anti-ship cruise missile protection design concepts. Completed vulnerability analyses of priority combat system equipments for the DD-963, CGN-36 and CGN-38 Class ships. Developed vulnerabiity model for large debris-type fragments. Developed analysis tools for predicting effects of combat damage [ ] Initiated engineering development of [ ] options. Selected [ ] and initiated procurement of prototype models including [ ] Completed protection concepts [ ] and initiated procurement of engineering developmental models. Completed vulnerability assessments and preliminary [ ] requirement studies [ ] Provided platform level [ ] Provided [ ] recommendations on [ ]

Project: S0384
Program Element: 63514N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Survivability
Title: Shipboard Damage Control
Budget Activity: 4 - Tactical Programs

] Completed development of [ ] to replace shock sensitive [ ] Initiated development of fire resistant material [ ] Analyzed [ ] ships. Developed damage resistant structural concepts for new ship designs. Defined combat system survivability requirements for use in system Top Level Requirements and equipment design specifications. Continued development of damage models for array antennas and improved fragment and blast vulnerability data and fixes for electronic components, antennas and ordnance. Continued Engineering Development Model prototypes [ ] Continued [ ] and initiate design of Engineering Development Model prototypes. Continued survivability improvement recommendations [ ] Continued design of prototype [ ] Continued development [ ] techniques. Initiated development of design technique guidelines, specifications and standards for survivability in new ship and system design. Completed Engineering Development Model for magazine sprinkler controls. Initiated testing of redesigned FP-180 proportioner. Test injection pump as possible replacement for FP-180 proportioner. Continued evaluation of smoke knockdown and fire extinguishing capabilities of fine water mist system. Completed evaluation of fire extinguishing techniques for shipboard cables. Initiated improvements in damage control communications, sound powered telephones and emergency alarm/announcing system. Contracted for production of Emergency Escape Breathing Device. Awarded contract for production of 2,600 oxygen indicators to completely replace Flame Safety Lamps in Fleet. Secured Approval for Service Use of damage control party fire fighting clothing. Conducted acceptance test on advanced fire detection system. Continued development [ ] Funding increase this fiscal year supported procurement [ ] Continued development of more efficient [ ] systems.

2. (U) FY 1982 Program: Complete survivability assessments for CVN-68, CGN-38, LHA-1, LCC-19 and DD-963 class ships. Continue backfit and forward fit fix development of total ship systems to provide the technology base necessary to modernize the Navy with survivable ships in response to Public Law 95-485. Initiate ship and ordnance alteration survivabilty technology transfer packages for the CGN-36, CGN-38, LHA-1, LCC-19, and CVN-68 Ship Classes. Continue development of damage models for array antennas and improve fragment and blast vulnerability data and fixes for electronic components, antennas and ordnance. Continue Engineering Development Model [ ] Deliver first units of [ ] installations. Continue survivability fix development [ ] Continue design of prototype [ ] Continue development of [ ] techniques. Develop smoke knockdown device for shipboard application. Perform technical/operational evaluation on fire detection system. Continue development of fire extinguishing agents (super concentrated Aequous Film Forming Foam, multi-purpose dry chemical and stored-pressure Purple K). Continue damage control communication improvements. Initiate development of an improved damage control console for Navy-wide applicability. Initiate redundant back up control systems consoles for [ ] and hull, mechanical and electrical systems. Continue development of [ ] Continue updating of

Project: S0384 Title: Ship Survivability
Program Element: 63514N Title: Shipboard Damage Control
DoD Mission Area: 238 - Other Naval Warfare Budget Activity: 4 - Tactical Programs

vulnerability data on equipments, especially fragmentation data for ordnance components and blast effects on antenna structures. Develop access closures optimized for damage control. Commence delivery of Emergency Escape Breathing Device to the Fleet. Commence distribution of damage control fire fighting clothing to the Fleet.

3. (U) FY 1983 Planned Program: Complete Engineering Development Model Continue engineering development Continue shock hardening prototypes for Continue updating combat system vulnerability data, initiating efforts on nuclear weapons effects. Funding increase this fiscal year supports procurement of prototype

New thrust in developing Continue project. Continue and cruiser/destroyer magazine protection. Continue fire protection and damage control systems and equipment development.

4. (U) FY 1984 Planned Program: Continue Continue development of survivability features Continue development of survivability engineering standards and procedures. Complete shock hardening prototypes Continue updating ship system vulnerability data. Continue development of damage tolerant structures. Continue development of techniques. Complete concept demonstration model of a redundant control system console for application to combat, hull, electrical and mechanical systems. Continue development of survivability enhancements for hull, mechanical and electrical systems. Conduct ordnance and propulsion vulnerability investigation. Complete development of Survivability requirements, standards, and specification guidelines. Complete assessment, preliminary hardening design and prototype fabrication and evaluation for Begin testing prototypes.

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0384	Ship Survivability	18,208	16,308	18,296	15,319	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63515N
Title: Advanced Identification Techniques
DOD Mission Area: 344 - Tactical Command and Control
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	992	3,810	2,247	772	Continuing	Continuing
W0460	Advanced Non-Cooperative Identification Technology	992	3,810	2,247	772	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Long range all-weather Non-Cooperative Target Recognition will significantly enhance wartime Command and Control and permit Commanders to utilize the full capability of today's long range intercept radar and missiles, and the efficient and optimum allocation of resources. This project is exploiting [ ] each of which provides a portion of the overall Non-Cooperative Target Recognition solution. A cooperative technique, [ ] is also being developed. New Long Range [ ] techniques are also being investigated.

(U) BASIS FOR FY 1983 REQUEST: [ ] As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Minor shifts (-$8 in FY 1981, -$55 in FY 1982 and -$68 in FY 1983) due to Navy fund realignment.

Program Element: 63515N
DOD Mission Area: 344 - Tactical Command and Control

Title: Advanced Identification Techniques
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	1,000	3,865	2,315	Continuing	Continuing
W0460	Advanced Non-Cooperative Identification Technology	0	1,000	3,865	2,315	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 63515N
DOD Mission Area: 344 - Tactical Command and Control

Title: Advanced Identification Techniques
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Modern weapons systems are capable of detection and destruction of enemy aircraft at ranges well beyond visual range. However, current rules of engagement generally prevent attacking these targets at ranges beyond visual range because of the inability to positively identify them as friendly or enemy. This project is developing target recognition capabilities and special purpose signal processing necessary to overcome this limitation. The[ ]system, which has completed Navy Operational Test and Evaluation, has been developed. [ ] It is being incorporated in F-14, F-18 and F-4J aircraft. This project is continuing to exploit[ ] A cooperative technique, [ ] is also being developed. Promising New Long Range techniques are also being investigated.

(U) RELATED ACTIVITIES: The Air Force has developed an offshoot of[ ] Techniques for the F-15 [ ] which is several years behind target recognition through[ ] Techniques. The Navy Target Recognition[ ] has been successfully interfaced and demonstrated on the HAWK, F-4J, F-14, improved HAWK missile systems, and the shipboard Terrier missile system. The Navy AN/SPG-55 and MK-115 shipboard systems also possess the technical characteristics that makes them candidates[ ] Techniques development has also been adapted by the Air Force for the F-15 [ ] and by the Army [ ] This technology is also under development and evaluation for implementation in the Navy F-18 aircraft and the Air Force F-15 aircraft. Program Element 64267N, Project W0467, developed the F-14 Target Identification Software necessary to implement various[ ] techniques into the F-14 weapons system[ ] Techniques algorithms.

(U) WORK PERFORMED BY: Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Hughes Aircraft Company, Culver City, CA (MFS); Westinghouse Corporation, Baltimore, MD; Calspan Corporation, Buffalo, NY; Scope Electronics, Inc., Reston, VA.

Program Element: 63515N
DOD Mission Area: 344 - Tactical Command and Control

Title: Advanced Identification Techniques
Budget Activity: 4 - Tactical Programs

PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: [feasibility was demonstrated first in 1968 in a Navy F-4J/AWG-10 Missile Control system.] algorithms have since been incorporated in the Navy's F-14/AWG-9 radar and are now being incorporated in F-4J, F-18 and Ship Fire Control Radars. systems have been developed to support signature Library requirements. Navy Technical Evaluation and Operational Test and Evaluation of [ ] Techniques have been completed in the F-4J and F-14 aircraft. SPG-55 [ ] has been installed in F-4 aircraft and successfully demonstrated in Ground-to-Air tests with the AN/AWG-10 missile control system and air-to-air tests with a TA-3B aircraft. This technology has also been transferred to the Coast Guard for air-to-sea (ship) identification and successfully demonstrated.

2. (U) FY 1982 Program: Continue testing of shipboard demonstration and HAWK battery tests. Check out installation of F-4J Digital Signal Analyzer modifications. Continue Sunflyer data collection. Continue Passive Non-Cooperative Target Recognition development for F-14 aircraft.

3. (U) FY 1983 Planned Program: Develop and fabricate an Advanced Development Model [system. Integrate and checkout the system and prepare for flight test. Continue testing of present breadboard] to expand signature library and investigate effects of various landing gear, flap and weapons carriage configuration. Continue [

4. (U) FY 1984 Planned Program: [

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63519N
Title: Advanced Command Data Systems
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

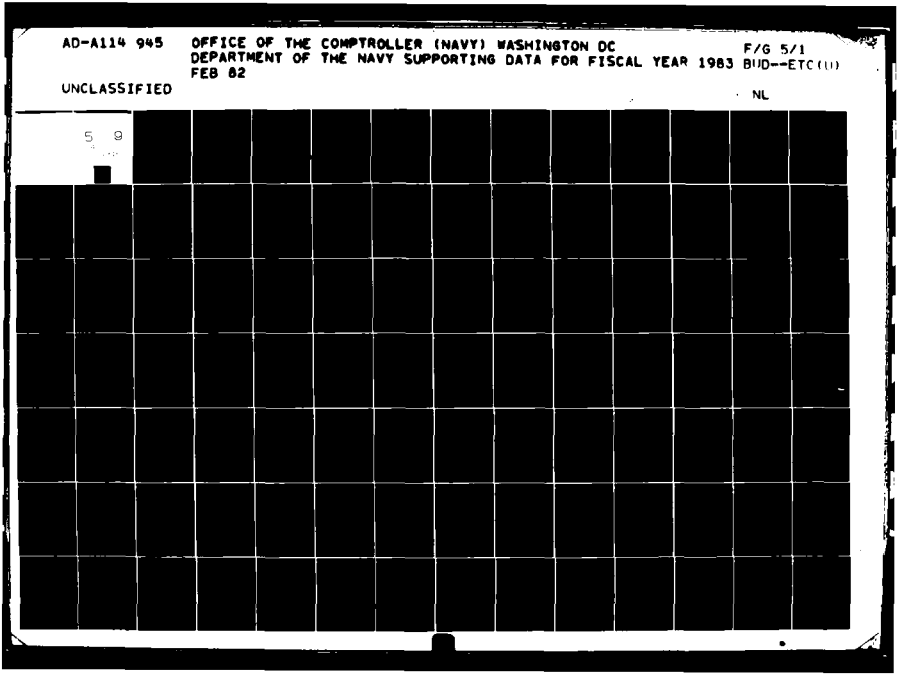
(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	362	2,359	4,412	5,026	Continuing	Continuing
S0245	Tactical Data Systems	0	2,359	4,412	5,026	Continuing	Continuing
X0710	Low Cost Link 11	362	0	0	0	0	4,380

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop standard shipboard Command Data Systems hardware, software, and interaction techniques to respond to the increasing complexity of operational situations being experienced by tactical commanders.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete cruiser and carrier Combat Direction System preliminary design, engineering development model specifications, and algorithm simulation models. Complete Surface Warfare, Weapons Control Systems, Ocean Surveillance, Acoustic and Tactical Flag Command Center System Interaction Guidance notebooks. Initiate design and planning for the enhancements required to automate other combat direction system equipped ship classes (e.g. LCC, LHA, DDG, etc.). The goal will be to treat the "family" of automated combat direction systems in a manner which will allow the necessary evolutionary improvements to curre tly deployed combat direction systems and the timely introduction of new combat direction systems. Commonality of systems architectures, hardware, software and training requirements will be emphasized. The increase from FY 1982 to FY 1983 is due to a decrease in the FY 1982 funds as a result of Congressional action. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1981 only for Project X0710 and through FY 1984 only for Project S0245.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are decreases of $56 and $1,512 in FY 1981 and FY 1983 respectively. These reductions resulted from overall Navy Research and Development budget adjustments. The decrease of $3,039 in FY 1982 resulted from a $2,655 Congressional reduction and other Navy budget adjustments.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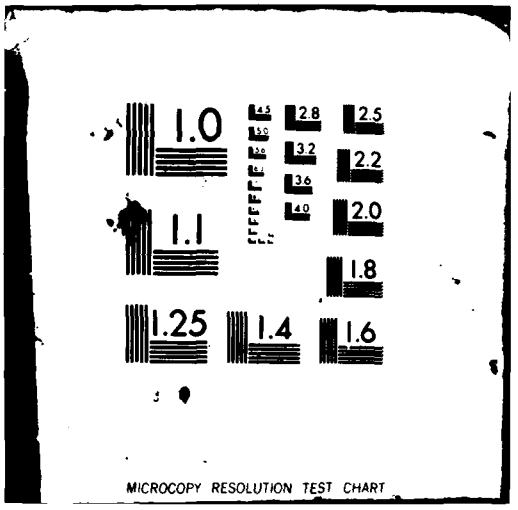
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Program Element: 63519N
DoD Mission Area: 345 - Tactical Communications

Title: Advanced Command Data Systems
Budget Activity: 4 - Tactical Programs

FUNDING AS REFLECTED IN THE FY 1982DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,754	418	5,398	5,924	Continuing	Continuing
S0245	Tactical Data Systems	3,754	0	5,398	5,924	Continuing	Continuing
X0710	Low Cost Link 11	0	418	0	0	0	4,436

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN (USQ-74) Quantity (Various Conponents)	0	557	1,732	3,353	9,072	14,714

Program Element: 63519N
Title: Advanced Combat Data Systems
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Advanced Command Data Systems is an advanced development program for developing hardware and software to exploit technological advances in computers and communications. It also integrates these developments into combat direction systems. The growing sophistication of the operational situation imposes ever increasing data handling requirements on the Combat Direction System, while reducing the time available for data processing, display, decision-making, data exchange, and execution of offensive and defensive actions. The purpose of the Advanced Command Data System Project is to plan and design new and enhanced families of combat direction systems to support tactical commanders. The following are tasks under this project: (1) develop display, peripheral, and software systems to permit effective interaction of Tactical Data Systems and to facilitate necessary interfacing with the Tactical Data Systems of the other Services, (2) maintain compatibility with existing Naval Tactical Data System equipment while providing the improved capabilities made possible by advanced technology such as the AN/UYK-43 Computer and AN/UYQ-21 Display, (3) develop and evaluate software management methods and standardization procedures to ensure system compatibility and reduce software costs, (4) provide new information integration algorithms, decision aids and combat control techniques required by tactical commanders, and (5) provide preplanned product improvement efforts necessary to maintain the fleets' automated combat direction systems in a state of maximum readiness.

(U) RELATED ACTIVITIES: UYQ-21, UYK-43, Joint Tactical Information Distribution System, Restructured Navy Tactical Data System, Organic Test/Training, Multi-Sensor Surveillance and Tracking, Command and Control System Assessment, Distributed Processing Technology for Ship Combat Systems, Display and Information processing for Ships and Submarines, Software Technology, and Human Factors Engineering for Surface Ships.

(U) WORK PERFORMED BY: In-House: Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Naval Oceans Systems Center, San Diego, CA. Contractors: Hughes Aircraft Co., Fullerton, CA; Sperry-Univac, St. Paul, MN; Vitro Laboratories, Silver Spring, MD; SEMCOR, Arlington, VA; Computer Research Inc., Buffalo, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Major accomplishment: (1) AN/UYK-7 computer was engineered for production and advanced software techniques, (2) advances in accomplishing bulk data transfer were achieved through the introduction of a second data link for the Integrated Operational Intelligence Center aboard an attack carrier, (3) airborne/shipboard data Link 11 was encrypted and passed operational evaluation, (4) advanced software/ hardware support for the anti-ship missile defense effort was initiated, (5) continuing effort in advanced display development, and (6) exploitation of more powerful Command and Control applications using the AN/UYK-7 computer, new associated components such as micromin magnetic tape unit and displays and expanded software techniques. Automatic Carrier Landing System, Junior Participating Tactical Data System, etc., were developed to assure maximum utilization of inherent system capabilities. (7) Commenced Advanced Multi-Sensor Track Management algorithm design and modeling for Advanced Combat Direction Systems and Advanced Decision Aids for Tactical Unit Commanders. Developed double density film memory

Program Element: 63519N
DoD Mission Area: 345 - Tactical Communications

Title: Advanced Combat Data Systems
Budget Activity: 4 - Tactical Programs

for AN/UYK-7. Completed initial development and testing of software security system. Prepared for Operational Evaluation of the USC-34, Low Cost Link 11 System.

2. (U) FY 1982 Program: Complete multi-source track management design and modeling. Complete advanced command decision and display aid designs. Commence design for incorporation of Joint Tactical Information Distribution System, Tactical Data Link J, Standardization Agreement 1241, etc., into Advanced Combat Direction Systems. Complete engineering development model specifications for Advanced Combat System development to be completed under Program Element 64518N, Combat Information Center Conversion. Conduct operational evaluation of the USC-34, Low Cost Link 11 System.

3. (U) FY 1983 Planned Program: Complete LCC/LHA specification, augment algorithm models, start Advanced Command Data System Block II design for engineering development model.

4. (U) FY 1984 Planned Program: Conduct major shipboard combat system simulations. Specify engineering development model hardware and software design. Update System Interaction Guidance Notebook.

5. (U) Program to Completion: Prepare Low Level System Interaction Guidance Notebook at Data Transmission Land Based Test Site. Complete Specifications for the total family of Advanced Combat Direction Systems that will eventually replace the current Navy Tactical Data System.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63521N
DoD Mission Area: 371 - Self-Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,033	3,915	0	0	Continuing	Continuing
X0679	Advanced Electronic Countermeasures Tubes	1,351	3,915	*	*	*	
X0680	Advanced Electronic Warfare Techniques	3,682	*	*	*	*	

*Incorporated into P.E. 64573N, Project X0954, Shipboard Electronic Warfare Improvements.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provide and evaluate for engineering development, countermeasures techniques and equipments to counter Soviet radar-guided, anti-ship threats. This program consists of the following projects: (1) X0679 Advanced Electronic Countermeasures Tubes - Development of critical electronic countermeasures output tubes and associated components to meet system requirements; (2) X0680 Advanced Electronic Warfare Techniques -Development and demonstration of innovative electronic warfare techniques that will counter advanced types of missile seekers that cannot be countered by currently implemented techniques.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Efforts are transferred to P.E. 64573N Shipboard Electronic Warfare Improvements in FY 1983. The above funding profile includes escalation and encompasses all work or development phases now planned or anticipated through FY 1982 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The difference between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows. X0679 Advanced Electronic Countermeasures Tubes, Minus $717 (FY 1981) due to reprogramming to a higher priority program and routine budget adjustments. Minus $56 (FY 1982) due to routine budget adjustments. Minus $4,629 (FY 1983) because effort was transitioned to P.E. 64573N Shipboard Electronic Warfare Improvements. X0680 Advanced Electronic Warfare Techniques, Minus $133 (FY 1981) due to routine budget adjustments.

Program Element: 63521N
DoD Mission Area: 371 - Self-Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,454	5,883	3,971	4,629	Continuing	Continuing
X0679	Advanced Electronic Countermeasures	3,167	2,068	3,971	4,629	Continuing	Continuing
X0680	Advanced Electronic Warfare Techniques	3,287	3,815	*	*	*	*

* Incorporated into P.E. 64573N Shipboard Electronic Warfare Improvements.

Program Element: 63521N
DoD Mission Area: 371 - Self-Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: X0679 Advanced Electronic Countermeasures Tubes - The effectiveness of electronic countermeasures equipment is based on the ability of that equipment to prevent enemy electronic systems from successfully performing the function for which they are designed. This is done by degrading the signal flow process of enemy electronic equipments. The enemy has made increasing use of the electromagnetic spectrum, resulting in an electronic countermeasures requirement for microwave transmitters with higher power and broader frequency coverage. This higher power must be made available in equipments with enough flexibility to respond to the varying threats within a given tactical situation and with short reaction time constraints. A key element in the successful development of higher powered electronic countermeasures equipment is the microwave power amplifier tube and associated components. The required operating characteristics are difficult to obtain and require long lead time for development. This project provides the advanced microwave tubes and associated special components otherwise unavailable for advanced and engineering development of electronic countermeasures systems. Major emphasis is on the development of broadband high-power tubes, such as traveling wave tubes, in the 2 to [redacted] Gigahertz range with peak power ranging from 1 to [redacted] kilowatts. X0680 Advanced Electronic Warfare Techniques - To insure that effective weapon systems are available to counter [redacted] a program for continually updating shipboard electronic warfare techniques is required. The project consisted of hardware implementation of [redacted] (CROSSEYE) technique which is effective against all known [redacted] The Advanced Electronic Warfare System effort transitions from Advanced (6.3) to Engineering (6.4) development in FY 1982.

(U) RELATED ACTIVITIES: Work in other services is monitored for applicability. These projects are directed within the context of all DoD electronic warfare, command and control system, and Antiship Missile Defense projects. X0680 Advanced Electronic Warfare Techniques project has been incorporated into Program Element 64573N, Shipboard Electronic Warfare Improvements, for engineering development in FY 1982. Project X0679 Advanced Electronic Countermeasures Tubes provides advanced development of tubes required for projects in Shipboard Electronic Warfare Improvements, Program Element 64573N, Project X0954.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Command, Washington, DC; Naval Research Laboratory, Washington, DC; Contractors: Hughes Aircraft Co., Fullerton, CA; Norden, Norwalk, CT; Varian Assoc., Beverly, MA; Microwave Associates, Burlington, MA; Litton Electron Tube Division, San Carlos, CA; Raytheon, Microwave and Power Tube Div., Waltham, MA; SWL Inc., McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: X0679 - Advanced Electronic Countermeasures Tubes - Developed [redacted] traveling wave tube for the AN/SLQ-17 shipboard deception repeater, designed and fabricated a parallel traveling wave tube high-power amplifier, and developed airborne jammer traveling wave tubes. Developed improved [redacted]

Program Element: 63521N
DoD Mission Area: 371 - Self-Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Programs

[ ] for CROSSEYE development effort, [ ] X0680: Advanced Electronic Warfare Techniques - Program initially funded end of second quarter FY 1977. Initiated competitive development of Advanced Electronic Warfare Systems (CROSSEYE) with two contractors. Completed testing (e.g., multipath) to validate simulation. Completed testing and evaluations of Advanced Electronic Warfare Systems models and initiated development

2. (U) FY 1982 Program: X0679 Advanced Electronic Countermeasures Tubes - Initiate development of CROSSEYE broadband traveling wave tube amplifier and associated components. Continue development of the [ ] Complete testing of the [ ] X0680 Advanced Electronic Warfare Techniques - Not funded for FY 1982 and beyond. (CROSSEYE) Advanced Electronic Warfare System effort transitions to PE 64573N, Shipboard Electronic Warfare Improvements in FY 1982.

3. (U) FY 1983 Planned Program: Not funded for FY 1983 and beyond. Transitions to PE 64573N, Shipboard Electronic Warfare Improvements in FY 1983.

4. (U) FY 1984 Planned Program: Program not funded in FY 1984.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63522N
Title: Advanced Submarine Support Equipment Program
DoD Mission Area: 324 - Tactical Intelligence and Related Activities Capabilities Development
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT						
X0770	Advanced Submarine Support Equipment Program Quantities						

*Quantities are too numerous to tabulate.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The program is designed to enhance the capability of submarines to conduct productive tactical surveillance and other submarine support missions. It uses the latest advances in technology to ensure timely response. The advanced development is directed at determining technical feasibility, military usefulness and financial acceptability of alternative advanced systems and techniques to enhance the attack class submarine surveillance capability to meet tactical support requirements. This program develops advanced development model equipments to provide development testing of theoretical concepts for application within various systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Advanced development of fully integrated Electronic Warfare Support Measures and Tactical Radio receivers for Submarine Advanced Combat System-configured attack submarines, and Direction Finding Equipment improved by improving accuracy. Signal exploitation for Direction of Arrival systems; Electronic Support Measures and periscope sensors improvement; enhancement and processing equipments; Submarine Detectability Reduction; Information Correlation and interfacing with tactical displays. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only. Decrease in funding from FY 1982 to FY 1983 is due to reduction of planned development effort.

(U) COMPARISON WITH FY 1981 DESCRIPTIVE SUMMARY: (Dollars in thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: (1) $2,037 of FY 1981 funding was reprogrammed and resulted in a reduction in planned FY 1981 effort. (2) Similar reduction of FY 1982 effort resulted in a -$1,172 change for that year. (3) The FY 1983 estimate has decreased by $3,451 due to program restructuring.

Program Element: 63522N
Title: Advanced Submarine Support Equipment Program
DoD Mission Area: 324 - Tactical Intelligence and Related Activities Capabilities Development
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT						
X0770	Advanced Submarine Support Equipment Program						

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63522N Title: Advanced Submarine Support Equipment Program
DoD Mission Area: 324 - Tactical Intelligence and Related Activities Capabilities Development Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program develops new diverse sensor/support systems to keep abreast of such new threat systems. It uses the latest advances in technology to ensure timely response. The program is directed at establishing the feasibility of a number of techniques and associated devices/equipment to enhance the tactical surveillance capabilities of U.S. submarines. for the Type 18 periscope have been developed and tested. An Interferometer Direction Finding System was tested and underwent operational evaluation. This advanced development will be directed at determining technical feasibility, military usefulness, and financial acceptability of alternative advanced sensor systems and techniques.

(U) RELATED ACTIVITIES: The work in this program dovetails with the development of those systems under Program Element 64515N, Project X0775, Submarine Support Equipment Program (Engineering). Also, there is very close coordination with technical sensors in Program Element 31325N, Project X0122, PRAIRIE WAGON. Close monitoring of other dofense and federal agencies is conducted by the Naval Material Command, Chief of Naval Operations, Assistant Secretary of the Navy (Research, Engineering and Systems) and Under Secretary of Defense (Research and Engineering) to take advantage of all available technology and to prevent unnecessary duplication of effort.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda and Annapolis, MD; Naval Underwater Systems Center, New London, CT and Newport, RI. Contractors: ARGO Systems, Palo Alto, CA; General Research Corporation, SWL Division, McLean VA; GTE Sylvania, Mountain View, CA; Litton Systems, Inc., AMECON Division, College Park, MD; Sanders Associates, Nashua, NH; Teledyne, Inc., Micronetics Division, San Diego, CA; and five others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Work was carried out on new materials for Three such materials were passed into the production and installation phase. Work was performed on Automatic Direction Finding Systems for periscope applications. The first model of an array of spiral and fast/slow switching antenna processors was tested in 1978. Advanced development models were completed and tested at sea. A Service Test Model was procured in 1978 under the engineering development Submarine Support Equipment Program. Naval Ocean Systems Center developed an advanced development model which was deployed in 1978. Design of AN/BLA-4 Electronic Warfare Support measures antenna was completed in 1981. Development of a low probability of intercept system was completed.

Program Element: 63522N
Title: Advanced Submarine Support Equipment Program
DoD Mission Area: 324 - Tactical Intelligence and Related Activities Capabilities Development
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continuation of program already underway, i.e., periscope anti-fouling techniques, development, Electronic Support Measures component evaluation, and recording techniques, and Type 18 periscope development including system development. Development of an advanced development model for a low cost data retrieval system for electronic support measures operators continues. The program develops advanced development model equipments to support development testing of theoretical concepts for application within various systems. An AN/BLA-4 Electronic Warfare Support Measures feasibility model is being built.

3. (U) FY 1983 Planned Program: Continuation of those programs addressed in FY 1982 that have not moved into engineering development. Continued development of electronic support measures equipments for future submarines, improvement of Tactical Display Systems, and Initiate design effort to develop the AN/WLQ-4 SEA NYMPH electronic warfare support measures system to support Submarine Advanced Combat System-configured 688 class submarines. Decrease in funding level ($1,878 thousand) from FY 1982 to 1983 is due to budget constraints. This program develops advanced development model equipments to support development testing of theoretical concepts for application within various systems.

4. (U) FY 1984 Planned Program: Continuation of those programs that have not moved into engineering development, improved miniaturized digital processing, multi-function periscope mast, and This program develops advanced development model equipment to support development tests of theoretical concepts for application within various systems.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63524N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Submarine Advanced Combat System (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimated	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,889	39,707	0	0	0	51,596 4/
S1346	Submarine Advanced Combat System (Advanced)	11,889	25,655 3/	0 3/	0	0 3/	37,544 3/
S1440	Enhanced Modular Signal Processor	0 1/	14,052	(14,497) 2/	(15,257) 2/	(Continuing) 2/	(Continuing) 2/
	(Quantities -						
	- Functional Development Models	(0)	(3)	(0)	(0)	(0)	(3)
	- Engineering Development Models)	(0)	(12)	(0)	(0)	(0)	(12)

1/ Funded at $5,400 thousand from project S1346 of this element in FY 1981.
2/ Project S1440 transitions to Program Element 64507N, Enhanced Modular Signal Processor, in FY 1983. Funding shown in parentheses is provided for convenience, and does not contribute to program element total in FY 1983 and later.
3/ Additional FY 1982 and subsequent funding is contained in Program Element 64524N (Submarine Advanced Combat System (Engineering)), project S1347. Total excludes $5,337 thousand in FY 1980 funds from Program Element 63504N, project S0970.
4/ Estimated cost of this Program Element as of the end of FY 1982, its final year of funding.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides for advanced development of a new generation combat suite for attack submarines. It is intended to provide these ships with clear tactical superiority in engagements with improved threat platforms. The documented need for this increased capability is based on the numerical superiority of Soviet naval forces together with identified and projected qualitative improvements to the individual Soviet submarine and Soviet ASW forces. It is further supported by the expanded role of the attack submarine. S1346 Submarine Advanced Combat System: The Submarine Advanced Combat System development program is structured in two phases. The basic development effort provides a combat system for the mid-1980s attack submarine construction program, with an option for use on ballistic missile submarines. The follow-on development provides for continuing analysis and conceptual development of block improvements to the combat system for follow-on attack and strategic submarines of the 1990s. The basic system architecture will be specifically designed to readily accommodate block improvements. Analysis and early development will drive the combat system-related part of the 1990s platform design. Advanced development for the program will be performed under this program element. S1440 Enhanced Modular Signal Processor: This project will develop the Enhanced Modular Signal Processor, a new Navy Standard Signal Processor which will also serve as an integral part of the acoustic subsystem for the Submarine Advanced Combat System.

ment: 63524N
Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Advanced)
Budget Activity: 4 - Tactical Programs

FOR FY 1983 RDT&E REQUEST: No FY 1983 funds are requested under this program element. Refer to the Descriptive for Program Elements 64507N, Enhanced Modular Signal Processor and 64524N, Submarine Advanced Combat System ng). The above funding includes outyear escalation and encompasses all work or development phases now planned or through FY 1982.

ISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the icriptive Summary and this Descriptive Summary are as follows: (1) The FY 1981 funding for Project S1346 has decreased to inflation adjustment. (2) The total estimate for FY 1982 has decreased by 1,475 due to inflation adjustments, for consultants, studies and analysis and other Navy budget adjustments (-1,264 and -211 in projects S1346 and S1440, y). (3) The FY 1983 total estimate has decreased by 20,532 due primarily to the transition of project S1440 to Program 507N (-16,346) and also to termination of project S1346 (-4,186). (4) FY 1982 termination of this program element om the project transitions described in (3) above. (5) The total cost of Submarine Advanced Combat System advanced t and the cost of program element as of its termination have been estimated as shown.

; AS REFLECTED IN THE FY 1981 DESCRIPTIVE SUMMARY:

Title	FY 1980 Actual	FY 1981 Estimated	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	0	12,000	41,182	20,532	*Continuing*	*Continuing*
Submarine Advanced Combat System	0*	12,000	26,919	4,186	Continuing	Continuing
Enhanced Modular Signal Processor	0**	0***	14,263	16,346	Continuing	Continuing

ed at $5,337 thousand in program element 63504N, project S0970-AS (Attack Submarine Federated Combat Systems Develop-

d at $430 thousand in Program Element 63504N, project S0970-AS (Attack Submarine Federated Combat Systems Development).
d at $5,400 thousand in project S1346-AS of this Program Element (Submarine Advanced Combat System).

APPROPRIATIONS FUNDS: None

Program Element: 63524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The increasing scope of attack submarine missions is taxing the capabilities of current generation combat systems. The growth capacity of these systems will not support new weapons capabilities needed to counter the projected threat beyond the 1980s without major changes in hardware and software. New hardware technology and new concepts in software design now make possible the design of a system with the requisite growth capacity and size to achieve significant improvements in combat system capability, improve system reliability, reduce training requirements, and realize significant savings in ownership costs over the life of the system. Additional improvements in combat system effectiveness and life cycle costs can also be achieved by treating the combat system as a whole during the development process rather than developing subsystems independently and interfacing them. To this end, the Submarine Advanced Combat System will be developed in two phases. The basic development effort will integrate current capabilities and near-term improvements into a federated system architecture. The products of ongoing development programs will be provided as government-furnished equipment to the Submarine Advanced Combat System prime contractor. Examples of these products are: the Submarine Active Detection Sonar, now in advanced development; the SEA NYMPH Electronics Warfare System, now in production; the Attack Submarine Integrated Communication System, scheduled to begin advanced development in 1984; the Enhanced Modular Signal Processor, initiating advanced development in 1982 and Engineering development in 1983, and standard Navy minicomputers such as the AN/UYK-43 and AN/UYK-44. Within the constraints of the equipment and the performance requirements specified by the Navy, the developing contractor will design the combat control and acoustic subsystems, the data distribution network, displays, and software necessary to integrate these elements into a common system architecture. The basic system architecture design will include the growth margin needed to accommodate the long-term follow-on developments. The Submarine Advanced Combat System Program will also establish a methodology to focus all present and future submarine combat system and sensor developments under one core program. At logical stages during the development, these programs will be consolidated under the Submarine Advanced Combat System program manager. The initial development program will provide a combat suite for installation on the SSN 688 class attack submarines of the mid-1980s shipbuilding program [ ] and will be constrained to using the sensor arrays and weapon launch/handling systems planned for these ships. Follow-on development will be required to provide the combat suite for the 1990s submarine shipbuilding program. This effort will build on the initially developed combat system architecture, influencing overall ship design to provide sensor configurations which optimize total combat system effectiveness. Continuing analysis of combat engagement requirements will influence the initial design and will quantify the improvements needed to counter the evolving threat and support the expanding mission of the submarine. The AN/UYS-2 Enhanced Modular Signal Processor is a special purpose digital computer available in a number of configurations to meet the signal processing needs of the user. It will increase the capabilities provided by AN/UYS-1 Advanced Signal Processor by an order of magnitude at the same cost, power and space requirements. It is designed to meet the signal processing needs of the Navy through the 1990's and will be designed to accept new technology making feasible the extension of its capabilities. Five standard size/cooling configurations will be developed for testing. The program will fabricate 12 engineering development models to represent critically-stressed user configurations and to meet first-user requirements. Three non-military-specification functional development models will be fabricated in the near term for software testing. The program includes software support for all user applications, which will make extensive use of previously developed software. The Submarine Advanced Combat System has been identified as the first user of the Enhanced Modular Signal Processor.

Program Element: 63524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: S1346 Submarine Advanced Combat System: Prior to FY 1981, the development of combat systems for future-design attack submarines was supported in Program Element 63504N, project S0970, Attack Submarine Federated Combat System Development and in Program Element 63569N, Attack Submarine Development. Acoustic systems concepts completing advanced development in Program Element 63504N will, if applicable, be transitioned to full scale engineering development in Program Element 64524N, Submarine Advanced Combat System (Engineering), project S1347. Full scale engineering development of the MK 117 Fire Control System and development of related software programs is continuing in Program Element 64562N, Submarine Tactical Warfare Systems (Engineering), project S0236, Attack Submarine Combat Control System Improvement Program. The Submarine Advanced Combat System provides capability to deliver the following submarine-launched weapons currently in development: Common ASW Standoff Weapon (Program Element 63367N); MK 48 Advanced Capabilities Torpedo (Program Elements 63691N and 64675N); TOMAHAWK (Program Element 64367N) and Submarine Launched Mobile Mines (Program Element 64601N, Project S1667). Other related programs include the following:

Program Element	
24163N, project X0695,	High Frequency Improvement
24281N (All Projects),	Submarines
31325N,	PRAIRIE WAGON
33109N, project X0731,	Fleet Satellite Communications
62633N,	SF 33-341, Undersea Weapons Guidance and Control
62721N,	XF 21-221, Tactical Acoustic Communications
63503N,	Acoustic Communications (Advanced)
63504N (All Projects),	Submarine Sonar Development (Advanced)
63509N, project S0248,	Shipboard Data System
63530N, project X0798,	Over-the-Horizon Targeting
63562N, project S0210,	Submarine Acoustic and Torpedo Countermeasures and S1686, Attack Submarine Combat Control Systems Improvement (Advanced)

Program Element	
63590N,	Wide Aperture Array (Advanced)
63708N, project S0823,	Acoustic Performance Prediction
64502N,	Submarine Integrated Antenna System
64503N,	Submarine Sonar Development (Engineering)
64507N,	Enhanced Modular Signal Processor
64514N (All Projects),	Navigation Systems
64515N,	Submarine Support Equipment Program
64524N, (Both Projects)	Submarine Advanced Combat System (Engineering)
64562N (All Projects),	Submarine Tactical Warfare Systems (Engineering)
64566N,	Acoustic Communications (Engineering)

S1440 Enhanced Modular Signal Processor: Enhanced Modular Signal Processor configurations will form the basic building block of a number of ASW sensor systems of which the earliest requirement is identified with the Combat Control/Acoustic subsystem of the Submarine Advanced Combat System (project S1346 of this element and project S1347 of Program Element 64524N). The Advanced Signal Processor Common Operating Software support being developed for the AN/UYS-1 (Program Element 64266N, project W0491, will be transportable to the Enhanced Modular Signal Processor.

rogram Element: 63524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Advanced)
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: The Naval Sea Systems Command, Washington, DC, has the responsibility of overall project management and for development and procurement of those system elements associated with acoustic and combat-control capabilities including the Enhanced Modular Signal Processor. The Naval Electronic Systems Command, Washington, DC, has the responsibility for development and procurement of those system elements associated with electronic warfare support measures and communications capabilities. Other Navy participants include: Naval Underwater Systems Center laboratories at Newport, RI, and New London, CT, Naval Ocean Systems Center, San Diego, CA; Naval Weapons Support Center, Crane, IN; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Personnel Research and Development Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren, VA; and Naval Research Laboratory, Washington, DC. Contractors: EG&G, Washington Analytic Services Center, Inc., Rockville, MD, has been selected competitively to support planned Submarine Advanced Combat Systems engineering and integration activities. The prime contractor for the Combat Control/Acoustics subsystems of Submarine Advanced Combat System will be selected by mid-FY 1982. The Johns Hopkins University, Applied Physics Laboratory, Laurel, MD, is under contract to provide technical support to the Enhanced Modular Signal Processor program (project S1440). The demonstration/validation competitors are: International Business Machines, Manassas, VA; Control Data Corporation, Minneapolis, MN; Western Electric, Greensboro, NC; Hughes Aircraft Corporation, Fullerton, CA, and Magnavox, Fort Wayne, IN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S1346 Submarine Advanced Combat System (Advanced) - The Submarine Advanced Combat System project was an FY 1981 new start. The top-down analytical effort and engineering studies which form the basis for the project were initiated in FY 1978 under the Attack Submarine Federated Combat System Development Program (Program Element 63504N, project S0970) and the Attack Submarine Combat Control Systems Improvement Program (Program Element 64562N, project S0236) as in-house efforts. The Attack Submarine Federated Combat System Development Program furnished FY 1980 funding for the Submarine Advanced Combat System effort. Completed identification of projected SSN 716 (baseline combat system) performance shortfalls for the 1990 and 2000 decades. Solicited industry participation in a competitive concept development. Commenced associated program coordination and completed development proposal. The Mission Element Need Statement was approved (Defense Systems Acquisition Review Council Milestone Zero) on 28 November 1980. A briefing for prospective industrial participants on the Combat Control/Acoustic subsystem was held in October 1980 and the request for proposal issued in December 1980. The request for proposal was modified in September 1981 to support a competitive selection of a single contractor for concept development. S1440 Enhanced Modular Signal Processor - The project was a FY 1982 new start. FY 1980 funding to support program initiation was provided by the Attack Submarine Federated Combat System Development Program (Program Element 63504N, project S0970). Acquisition plan, statement of work, purchase description and request for proposal were prepared. FY 1981 effort, funded under project S1346 of this element, included competitive concept definition, selection of five Demonstration/Validation phase contractors and initiation of the demonstration/validation phase.

(U) FY 1982 Program: S1346 Submarine Advanced Combat System (Advanced) - Award concept development contracts to selected contractor. Continue associated program coordination. Commence critical item testing in support of the Combat Control/Acoustic

subsystem. Continue total combat system effectiveness evaluations against the projected threat. Commence development of the following documentation: Decision Coordinating Paper/Integrated Program Summary, Test and Evaluation Master Plan, Top-Level Requirements document, Combat System Design Requirements for total combat system and Integrated Logistic Support Plan. S1440 Enhanced Modular Signal Processor - The five contractors selected in FY 1981 will complete the competitive design and validate that the risks inherent in their design can be mitigated. A Milestone II decision will be obtained to allow the Enhanced Modular Signal Processor to proceed into full scale development. The five designs will be evaluated and one will be chosen to proceed into full scale development and complete the design of the hardware, software and support programs under an option existing in the FY 1981 contracts. This activity will include fabrication of 3 Functional Development Models and 12 Engineering Development Models. The design will be placed under configuration management. All necessary experimental work will have been performed and the proposed system will be ready for full-scale development.

3. (U) FY 1983 Planned Program: S1346 Submarine Advanced Combat System (Advanced) - Program continues in Program Element 64524N, project S134[illegible]. S1440-AS Enhanced Modular Signal Processor - Transition the AN/UYS-2 Enhanced Modular Signal Processor to full scale engineering development, Program Element 64507N.

4. (U) FY 1984 Planned Program: Refer to Descriptive Summaries for Program Elements 64524N (Submarine Advanced Combat System (Engineering)) and 64507N (Enhanced Modular Signal Processor).

5. (U) Program to Completion: Refer to Descriptive Summaries for Program elements 64524N (Submarine Advanced Combat System (Engineering)) and 64507N (Enhanced Modular Signal Processor).

6. (U) Milestones:

a. Milestones (Submarine Advanced Combat System)

		Date
(1) Approval of Mission Element Need Statement (Defense Systems Acquisition Review Council Milestone 0)		November 1980
(2) Integrated Logistic Support Plan Outlined	(January 1981)*	April 1981
(3) Request for Proposals for Concept Definition Issued	(January 1981)*	February 1981
(4) Concept Definition Contract Awarded	(April 1981)*	March 1982
(5) Defense Systems Acquisition Review Council Milestones I/IIa (Decision Coordinating Paper Approved)	(May 1982)*	February 1983
(6) Transition to Program Element 64524N; project S1347	(May 1982)*	October 1982
(7) Critical Item Tests	(June 1981-August 1982)*	April 1982 - July 1983

Program Element: 63524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System-(Advanced)
Budget Activity: 4 - Tactical Programs

* Milestones from FY 1982 Descriptive Summary. Changes in milestones (4) - (7) are due to restructuring of the program.

b. Milestones (Enhanced Modular Signal Processor)

	Date
Development Contract Award	[redacted]

* Milestone shown in FY 1982 Descriptive Summary. [redacted] later milestones are shown in the Descriptive Summary for Program Element 64507N. Milestone delay is due to restructuring of the program.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63525N
Title: Pilot Fish
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	34,817	57,388	93,823	99,766	Continuing	Continuing
T0428	Pilot Fish	34,817	57,388	93,823	99,766	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Details of this program are of a higher classification and of limited access nature.

(U) BASIS FOR FY 1983 RDT&E REQUEST: As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63528N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Non-Acoustic Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12,984	11,164	11,533	15,053	Continuing	Continuing
S0967	Non-Acoustic Anti-Submarine Warfare	12,984	11,164	11,533	15,053	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED:

The purpose of this program is to review the progress in Non-Acoustic Anti-Submarine Warfare in the areas of basic research, exploratory development, and the work accomplished by the Navy's strategic submarine security program, and to select those Non-Acoustic Anti-Submarine Warfare concepts that offer the greatest potential for exploitation. Those concepts will then be assessed, in the context of an advanced development program, for implementation on air, surface, and submarine anti-submarine warfare platforms.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The primary effort in FY 1983 will be on at-sea deployment tests and continued refinement of prototype detectors. Other work in FY 1983 will include the investigation of magnetohydrodynamic sensors and the continuing assessment of other non-acoustic detection techniques. It is anticipated that the results of these efforts will contribute to the data base leading to a decision for transition of the sensor to engineering development and the continuation of the assessment programs for exploitation of other non-acoustic phenomena into FY 1984. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are (1) decrease of $1,332 in FY 1981 due to reduction of planned FY 1981 effort and reassessed inflation factors. This resulted in the delay of any further assessment of magnetohydrodynamic phenomenon for ASW exploitability. (2) Decreases of $1,182 and $6,346 in FY 1982 and FY 1983 respectively reflect significant reduction of effort on the detector design and total elimination of further assessment of sensor development until FY 1984. The Chief of Naval Operations has declassified the funding profiles for this program.

Program Element: 63528N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Non-Acoustic Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Aidtional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,413	14,316	12,346	17,879	Continuing	Continuing
S0967	Non-Acoustic Anti-Submarine Warfare	7,413	14,316	12,346	17,879	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 63528N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Non-Acoustic Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION:

The occurrence of non-acoustic phenomena may be classified into three general categories based on the underlying physics which describe the generation of the observable phenomena. Motion phenomena include observable signatures of the submarine that are created by the disturbance of the ocean medium through which it is moving. Emissions include all effluents that are deposited in the ocean medium of the submarine, and any electromagnetic fields that are created by either the operation of machinery or the flow of water around the submarine body. The passive category includes observable phenomena that are independent of the motion or actions of the submarine. The understanding of these phenomena and their detection lies in the forefront of science and technology and has been limited to work that falls in the areas of fundamental research and exploratory development. Because of the budding and dynamic nature of non-acoustics it is essential that the progress to date be fully assessed. Furthermore, those techniques with sufficient maturity must be evaluated in the context of an advanced development program in order to gauge their military utility.

(U) RELATED ACTIVITIES: This program will draw heavily on the non-acoustic work already accomplished and continuing

The Defense Advanced Research Projects Agency is also conducting basic research in non-acoustic phenomena. Coordination of these efforts is being accomplished through the Coordination Committee for Development of Non-Acoustic Anti-Submarine Warfare Techniques which consists of the top level management of all related Non-Acoustic Anti-Submarine Warfare activities. The committee reviews all efforts in the field of non-acoustics and ensures that redundant efforts are avoided.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Coastal Systems Center, Panama City, FL; Naval Research Laboratory, Washington, DC; and others to be determined. Contractors: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; Texas Instruments Corp., Dallas, TX; D. H. Wagner Associates, Paoli, PA; TRW Space Systems, Redondo Beach, CA; and others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A preliminary sensor (NA-1) was fabricated and tested at sea. Analysis of data from that test commenced in FY 1979 and continued into FY 1980. detectors offering the greatest potential as operational sensors in the near term received the primary emphasis in FY 1980. The NA-1 sensor was

modified and retested at sea. A data base was formed to allow a decision to be made pertinent to the development of a prototype NA-1 sensor in FY 1981. Evaluation of sensors based on test range and laboratory experiments were carried out in FY 1980. A set of system performance requirements for a was developed in FY 1981. The performance capability of the was evaluated in FY 1981. Exploratory development and strategic submarine technology were surveyed.

2. (U) FY 1982 Program: The primary effort in FY 1982 will be on at-sea deployment tests and assessment of prototype detector. Other work in FY 1982 will include an at-sea test of a magnetohydrodynamic sensor and continued investigation of, sensors. The assessment of other non-acoustic detection techniques will continue. It is anticipated that the results of these efforts will strengthen the data base leading to a decision for transition to engineering development of the sensor and the continuation of the assessment programs for exploitation of other non-acoustic phenomena. Assessment of a new candidate technology will be initiated and is responsible for the increment funding level. Details of this program are beyond the classification of this document.

3. (U) FY 1983 Planned Program: Effort is continuing toward a decision to be made pertaining to the transition to engineering development of the NA-1 sensor. The FY 1983 effort will continue the evaluation of the magnetohydrodynamic sensors and consider operational tactics for optional sensor employment. Assessment of the new candidate technology will continue and accounts for a significant portion of the incremental funding. The remaining effort will be determined by the progress in the exploration of other non-acoustic phenomena and will continue into FY 1984.

4. (U) FY 1984 Planned Program: The design, development, test and evaluation of the sensor systems for ASW exploitability will continue.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63529N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Advanced Anti-Submarine Warfare Target
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	759	832	3,919	10,684	69,461	87,155
S0968	*Advanced Anti-Submarine Warfare Target*	759	832	3,919	10,684	69,461	87,155
	Quantity					(DT&E/OT&E)	(6)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The development program will provide an Advanced Anti-Submarine Warfare Target and associated support equipment which will realistically simulate the submarine threat. The Advanced Target will be an underwater vehicle capable of duplicating the acoustic and dynamic characteristics of future threat submarines. Such a mobile target does not currently exist, but is required to provide the maximum degree of target realism. The primary mission of the target is for training of fleet personnel, *with a secondary mission of test and evaluation of advanced weapons* currently in development. Targets MK-30 Mod 1 and MK 27 Mod 0 are presently in the Navy's inventory but they will not provide the degree of threat realism required nor are their design characteristics compatible with new advanced sensor and weapon systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Efforts through FY 1982 consisted of technology assessment development in the areas and launch and recovery system development. FY 1983 effort initiates the formal Advanced Development phase with award of the advanced development contract at the end of the second quarter which explains the increase in funding from FY 1982 to FY 1983. The above funding profile includes outyear escalation and encompasses *all work or development* phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary result in a total program increase of $2,645. Minor program funding fluctuations evidenced as a $94 increase in FY 1981, a $36 decrease in FY 1982, and a $120 decrease in FY 1983 are attributed to revised inflation/escalation factors and overall Navy budget reductions. The overall total program increase of $2,645 places program milestones more in line with approved near-term funding levels.

Program Element: 63529N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Anti-Submarine Warfare Target
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,500	665	868	4,039	77,438	84,510
S0968	Advanced Anti-Submarine Warfare Target	1,500	665	868	4,039	77,438	84,510

(U) OTHER APPROPRIATION FUNDS: To be determined.

Program Element: 63529N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Anti-Submarine Warfare Target
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The present submarine threat is simulated by the Mobile Targets MK-27 Mod 0 and MK-30 Mod 1 for Anti-Submarine Warfare fleet training and sensor and weapons evaluation. However, the future submarine threat is characterized as being faster, deeper and quieter. Available targets will not provide an adequate representation of these enhanced characteristics. To counter this expanded scenario of sophistication, new Anti-Submarine Warfare weapons such as the MK-XX advanced lightweight and the MK-48 advanced capability torpedoes are now in development. As a result, development of an advanced Anti-Submarine Warfare target is necessary to provide a proper degree of threat representation for fleet Anti-Submarine Warfare training. The requirement for realistic threat simulation will require the development of new target technology. It is planned to develop a mobile target capability which will be acoustically and functionally capable of realistically exercising and evaluating new acoustic sensors and weapons as well as fleet Anti-Submarine Warfare forces. These new target capabilities are in the areas of [redacted] Other characteristics desirable in the new target capability include: [redacted] New technologies in the [redacted] fields will be investigated and incorporated, as applicable, during the target development process. The six targets available by the end of engineering development are required to support operational evaluation and technical evaluation prior to reaching approval for service use.

(U) RELATED ACTIVITIES: Program Element 63610N/64610N, Advanced Lightweight Torpedo (ALWT) with performance characteristics which will [redacted] PE 63691N, Development of the MK-48 Advanced Capability Torpedo.

(U) WORK PERFORMED BY: In House: Naval Sea Systems Command, Washington, DC; Naval Underwater Systems Center, Newport, RI (lead laboratory). Contractor: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This was a new start in FY 1979. Initiated concept definition studies and investigations in the [redacted] areas. Initiated fabrication of breadboard [redacted] hardware. Initiated fabrication of launch and recovery system hardware. Initiated life cycle cost and design-to-cost studies. Navy Decision Coordinating Paper, SO-968, dated 21 July 1980, approved modification of the MK-30 Mod I target as the preferred alternative. Initiated hydrodynamic and acoustic testing of breadboard [redacted]

lement: 63529N
on Area: 233 - Anti-Submarine Warfare

Title: Advanced Anti-Submarine Warfare Target
Budget Activity: 4 - Tactical Programs

32 Program: Continue hydrodynamic and acoustic testing of breadboard [redacted] Initiate flight acceptance testing
and recovery system hardware. Complete life cycle cost and design-to-cost studies. Establish technical information
potential prime contractor. Prepare Test and Evaluation Master Plan. Prepare system level advanced development model
tion. Prepare and issue advanced development model request for proposal.

FY 1983 Planned Program: Complete contractor source selection. Negotiate and award the advanced development phase for the development and fabrication of three models.

f 1984 Planned Program: Continue design, development and fabrication of the advanced development models.

ogram to Completion: Complete delivery and test of three advanced development models. Update Navy Decision Coordinating Test and Evaluation Master Plan for Milestone II. Award engineering development model contract. Complete delivery and six engineering development model targets, to include three provided through advanced development. Complete technical and operational evaluation and obtain approval for service use. Complete Milestone III.

Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63531N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: HY-130 Steel
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,533	955	0	0	0	38,266
S0385	HY-130 Steel	1,533	955	0	0	0	38,266

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Certify HY-130 steel (130,000 pounds per square inch yield strength) for future attack submarine construction. Element supports Deep Submergence Technology mission.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Program completes in FY 1982. The above funding includes escalation and encompasses all work or development phases now planned or anticipated through FY 1982 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are: (1) FY 1981 shows a decrease of 26 due to escalation reduction. A decision to complete the program in FY 1982 (one year earlier than indicated in the FY 1982 Descriptive Summary) has resulted in decreases in the FY 1982 and FY 1983 estimates (-734 and -1,837, respectively). The total estimated cost of the program has decreased by 2,597 as a result of the above changes.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,064	1,559	1,689	1,837	0	40,863
S0385	HY-130 Steel	1,064	1,559	1,689	1,837	0	40,863

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 63531N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: HY-130 Steel
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: In 1950 HY-80 steel came directly from the laboratory to submarine shipbuilding programs without large-scale preproduction hull and shipyard certification, resulting in high cost fabrication problems and delayed ship deliveries. Based upon a need for higher strength steel, exploratory development was initiated to certify a tough weldable steel (HY-130) that would yield improved trade-off capabilities of ship displacement, depth or speed. This certification provides HY-130 submarine hull material and construction specifications, shipbuilder qualification, welded fabrication, non-destructive testing, and simulated testing of large/full-scale submarine hull models representative of those planned for future submarine designs.

(U) RELATED ACTIVITIES: Program Element 62543N, Ship, Submarines and Boats Technology, SF-43-422-250, Structures for Combatant Submarines, is doing basic work on lower yield strength fracture-resistant weld metals which, if successful, will reduce fabrication costs. A fracture mechanics model is being tested to develop data on the initiation and propagation of environmentally assisted cracking and hydrostatic strength response. Computer analysis studies are being conducted for various structural configurations. Program Element 64559N, project S0345, Nuclear Hull Test Vehicle, which is planned to resume in FY 1985, is the final step in certification of HY-130 steel for submarine hulls.

(U) WORK PERFORMED BY: In-House: Mare Island Naval Shipyard, Vallejo, CA; Portsmouth Naval Shipyard, Portsmouth, NH; Norfolk Naval Shipyard, Portsmouth, VA; Naval Research Laboratory, Washington, DC; Naval Sea Systems Command, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda and Annapolis, MD; David W. Taylor Naval Ship Research and Development Center, Underwater Explosions Research Division, Portsmouth, VA. Contractors: General Dynamics Corporation, Electric Boat Division, Groton, CT; U. S. Steel Corporation, Pittsburgh, PA; Lukens Steel Company, Coatesville, PA; Litton Industries, Pascagoula, MS; Tenneco, Newport News, VA; Jorgensen Steel Company, Seattle, WA; Curtiss-Wright Corporation, Buffalo, NY; Union Carbide Corporation, Linde Division, New York, NY; McKay Company, Pittsburgh, PA; AIRCO, Welding Products Division, Sparrows Point, MD; and eight others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A tough, weldable 130,000 pounds per square inch minimum yield strength (HY-130) steel weldment system was developed. Approximately 1,400 tons of HY-130 steel plate, forgings, extrusions, castings and welding electrodes were procured for large and small-scale model fabrication. Five submarine building and/or repair yards participated in fabricating sections of large and small-scale fatigue and underwater explosion test structures. Completed extensive welding procedures/control program to define shipyard welding procedures for alleviation of hydrogen restraint cracking while retaining adequate strength levels. Constructed a 7/10-scale model (A-2.7) of a [redacted] submarine for fatigue and stress corrosion testing, constructed a full-scale model of a [redacted] submarine (A/B-1) for fatigue testing of internal tanks, stress corrosion and underwater explosion testing; and constructed a section of a [redacted] submarine (C-1) for final fabrication evaluation and stress corrosion testing. An extensive testing program to characterize

Program Element: 63531N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: HY-130 Steel
Budget Activity: 4 - Tactical Programs

response of cathodically protected HY-130 steel weldment system to seawater environment under no load and cyclic loading conditions has been completed. The cyclic loading on the 7/10-scale model, and all cyclic loading on the hard tank structure of the full-scale model have been completed. Military procurement specifications are now available for HY-130 steel plate, forgings and welding electrodes. Preliminary draft procurement specifications are available for extruded shapes and castings. A military standard has been issued for the shipyard fabrication of HY-130 steel submarine hull structures. Static strength design procedures for [redacted] submarines have been developed and verified. A second draft of the static strength design procedures/criteria manual for [redacted] submarines has been developed. There exists at the present time an adequate industrial base, and shipyard facilities at the Electric Boat Division, General Dynamics Corporation, to build a Nuclear Hull Test Vehicle. Final draft reports on the materials and welding development phases of the program were prepared. A production source for volume plate supply has been qualified. Full-scale structural element underwater explosion testing has been conducted with both HY-130 steel and HY-80 steel for comparison purposes to establish shock resistance. The one-fifth-scale Design Procedures Demonstration Model was hydrostatic strength tested in mid FY 1981.

3. (U) FY 1982 Planned Program: Issue Submarine Structural Design Manual. Final report and analyses of underwater explosion structural element tests and hydrostatic strength tests of Design Procedures Demonstration Model will be completed. Finalize underwater explosion strength criteria for submarine hull structures. Complete final draft of the final report on the materials, welding and design development phase of the program. Complete final draft of Attack Submarine Surveillance Inspection Procedures. Final assessments and final report of the entire HY-130 steel program will be prepared. All test data will be evaluated, and finalized material and fabrication specifications, and maintenance/surveillance procedures for combatant and experimental submarines will be issued. Program completed.

3. (U) FY 1983 Planned Program: Program completes in FY 1982.

4. (U) FY 1984 Planned Program: Program completes in FY 1982.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63532N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Systems Engineering Standards
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,933	9,980	1,749	1,672	Continuing	Continuing
S1379	Ship Systems Engineering Standards	5,933	9,980	1,749	1,672	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Ship Systems Engineering Standards Program will develop engineering standards to allow the decoupling of ship's platform and payload by completing definition of the interface constraints early in the design process. This will reduce the risks of concurrent development, shorten construction time and greatly reduce the time required for modernization/conversion.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Engineering standards will be finalized for the DDGX and will be validated, and initial training and operability planned. Ship System Engineering Standards will be reviewed and revised as required for application beyond the DDGX and initial work begun related to the incorporation of Ship System Engineering Standards elements in active fleet modernizations/conversions. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: Minor budget adjustments resulted in a reduction of $67 in FY 1981. In FY 1982 a net increase resulted from Congressional addition of $8,000 to incorporate this design philosophy in the DDGX and a decrease of $57 during the Navy Budgetary process. The FY 1983 decrease of $299 results from cost refinements.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,000	6,000	2,037*	2,048	Continuing	Continuing
S1379	Ship Systems Engineering Standard	8,000	6,000	2,037	2,048	Continuing	Continuing

Program Element: 63532N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Systems Engineering Standards
Budget Activity: 4 - Tactical Programs

*FY 1982 new start. No funds were requested in FY 1981. The $6.0 million provided by Congress in FY 1981 was planned to be utilized in FY 1981.

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 63532N
Title: Ship Systems Engineering Standards
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The design, construction, and modernization of surface combatants has become increasingly complex in the last twenty years. Additionally, the sequential design and development of combat systems and the ships to house them has resulted in an average lead time of fourteen years for new weapons to be introduced to the fleet. Although some advance manufacturing and modular construction techniques have been developed, they are not universally applied and do not offer fundamental relief to these increasingly severe problems. The development of the Ship Systems Engineering Standards process will enable the hull and payload to be simultaneously and independently designed and constructed. The Ship Systems Engineering Standards design and construction process will be based on utilization of the Variable Payload Ship concept of physical and functional decoupling of platform and payload. The product of the Ship Systems Engineering Standards Program will not be a system but rather a set of comprehensive design standards and guidelines for the application of these standards to new ship and combat system design and construction. The Ship Systems Engineering Standards Program, when fully realized, will provide improvements in these areas:

o State of the art technology available up to 7 years earlier for Fleet Initial Operating Capability.

o Single design to satisfy a variety of requirements - standard hull provides economy of scale.

o Separation of platform and payload simplify shipyard process and shortens construction time by 3 months.

o Modernization/conversion approximately 80% faster - increase ship availability.

(U) RELATED ACTIVITIES: The Ship Systems Engineering Standards Program includes both generic-type work and application-oriented work. The generic work was to be funded under PE 63532N. The Congress appropriated an additional $7,900,000 in FY 1982, needed to support the Variable Payload Ship design of the DDGX in this program element.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, D.C.; Naval Electronics Systems Command, Washington, D.C.; Naval Air Systems Command, Washington, D.C.; Naval Facilities Engineering Command, Washington, D.C.; Naval Shipyards; Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren, Va. Contractors: Sperry, Great Neck, NY; Martin-Marietta, Orlando, FL; FMC, Minneapolis, MN; Ingalls, Pascagoula, MS; Todd, San Pedro, CA.; Hughes Aircraft Co. Ground Systems Group, Fullerton, CA.

Program Element: 63532N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Systems Engineering Standards
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Feasibility has been demonstrated. Data collection, engineering, design costing, and logistics efforts will proceed toward developing preliminary ship system engineering standards for mid-sized combatants. The preliminary engineering standards for zones and ship spaces have been developed for inclusion in the DDGX Preliminary design phase and the preparation of payload interface standards have continued. The implementation of supporting logistics, engineering, test and evaluation and information development efforts was planned.

2. (U) FY 1982 Program: Models and mock-ups will be developed to evaluate and verify the standards as they are developed. The design of the mid-size combatant will be continued to assess the impact of Ship System Engineering Standards on ship design and to support the development of the zone and module standards. Variable payload design work for DDGX will be initiated.

3. (U) FY 1983 Planned Program: Ship Systems Engineering Standards development will continue for large-size and small-size combatants. Large scale replicas of equipment will be fabricated and tested to determine adequacy of the standards and design criteria and to develop ship and systems construction process flow, and to determine test and evaluation procedures.

4. (U) FY 1984 Planned Program: The Ship Systems Engineering Standards will be validated through testing and application analysis as they are applied to hardware of various sections of the DDGX and other ship applications. Ship System Engineering Standards and design criteria will continue to be developed for a small-size combatant and a large size combatant. These standards will be tested by developing concept designs for a frigate size variable payload ship and a cruiser size variable payload ship.

5. (U) Program to Completion: Work will continue with industry to develop procedures and techniques for the construction, installation and testing of a variable payload ship and equipments.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63537N
Title: Retract Silver
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	63,446	94,365	105,644	Continuing	Continuing
R1483	Retract Silver	0	63,446	94,365	105,644	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Details of this program are of a higher classification and of limited access nature.

(U) BASIS FOR FY 1983 RDT&E REQUEST: As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63539N
Title: Retract Amber
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,468	17,945	13,017	4,158	0	43,588
R1367	Retract Amber	8,468	17,945	13,017	4,158	0	43,588

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Details of this program are of a higher classification and of limited access nature.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63540N
Title: Diesel Electric Submarine
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	497	2,500	0	0	0	2,997
S1510	Diesel Electric Submarine	497	2,500	0	0	0	2,997

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element contains resources for investigation of concepts related to the design, acquisition and operation of non-nuclear submarines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: No funds will be requested under this Program Element. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1982.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: (1) The FY 1981 funding has decreased by 3 due to inflation adjustment. (2) The program has been extended into FY 1982 by Congressional authorization and appropriation of 2,500 in that year. (3) The total estimated cost of the program has increased by 2,497 due to the above changes.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	500	0	0	0	500
S1510	Diesel Electric Submarine	0	500	0	0	0	500

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63540N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Diesel Electric Submarine
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program investigates various aspects of the acquisition and future operation of various non-nuclear submarine types (including diesel electric submarines) as members of an attack submarine force. Design options for conventional submarines are investigated. Research is initiated into conventional submarine battery, diesel engine, and motor technology. A conventional submarine research and development program will be developed. A detailed evaluation of the German Howaldtswerke-Deutschewerft firm offer to provide a diesel design that could be produced in U.S. shipyards will be conducted. Other potential design options will be examined.

(U) RELATED ACTIVITIES: Fundamental study efforts on which this work is based were conducted as part of the Attack Submarine Concept Formulation effort under program element 63564N, Ship Concept Formulation, Project S0408. Attack submarine designs for the mid-1980's and later construction programs are funded by program element 63569N, Attack Submarine Development.

(U) WORK PERFORMED BY: In-house: Office of Naval Research, Arlington, VA; Naval Sea Systems Command, Washington, DC; Chief of Naval Operations, Washington, DC. Contractors: Science Applications, Inc., McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Secretary of the Navy Submarine Alternative Study was completed in FY 1980. Volume VII of the study addresses Diesel Electric Submarines. The Diesel-Electric Submarine force Mix study was completed in FY 1981.

2. (U) FY 1982 Program: Study options for conventional submarine designs. Provide recommended research and development program, including cost, that would lead to a design suitable for authorization. Conduct a detailed evaluation of the offer from the Howaldtswerke-Deutschewerft firm to provide a diesel design that could be produced in U.S. shipyards. Prepare final report for submission to Congress.

3. (U) FY 1983 Planned Program: Not applicable. Program completed in FY 1982.

4. (U) FY 1984 Planned Program: Not applicable. Program completed in FY 1982.

5. (U) Program to Completion: Not applicable. Program completed in FY 1982.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63553N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Surface Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,030	5,883	4,408	4,715	Continuing	Continuing
S0220	Advanced Surface Sonar	2,279	1,864	0	0	0	20,865
S0229	Surface Ship Silencing	3,751	4,019	4,408	4,715	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will develop new surface ship anti-submarine warfare sensors and performance improvements to existing surface anti-submarine warfare sensor systems. Ongoing efforts focus on the development of lightweight acoustic sensors for future surface ships, implementation of acoustic quieting for surface ships, improvements to existing surface ship sonars, and development of active and passive subsystem improvements for future surface ship sonars.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0220, Advanced Surface Sonar was terminated due to affordability after FY 1982. Project S0229, Surface Ship Silencing: Complete follow-on at-sea evaluations of FF-1052 class ship's service turbine generator quieting. Continue selected FF-1052 and DD-963 class source quieting design studies based upon at-sea product evaluation and diagnostic testing results. Conduct FFG-7 class diagnostic evaluations. Initiate FFG-7 class design studies based upon diagnostic findings. Demonstrate application of FF-1052 products to DD-963 class ships. Initiate studies for application of existing developments to other classes of ships. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: S0220, Advanced Surface Sonar: This project has been terminated and no longer is funded in FY 1983 and out. Sufficient FY 1982 funding is provided to terminate the program in an orderly fashion. S0229, Surface Ship Silencing: the decreases of 436 in FY 1981, 166 in FY 1982 and 495 in FY 1983 reflect Navy response to Congressional and administration actions, including general reductions for inflation.

Program Element: 63553N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	16,408	6,688	9,328	15,597	Continuing	Continuing
S0220	Advanced Surface Sonar	10,508	2,501	5,143	10,694	Continuing	Continuing
S0229	Surface Ship Silencing	5,900	4,187	4,185	4,903	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981	FY 1982	FY 1983	FY 1984	Additional to Completion	Total Estimated Cost
OPN (Surface Ship Silencing Hull Mechanical and Electrical)	-	1,959	6,822	1,516	Continuing	Continuing
O&MN	200	876	7,544	6,987	Continuing	Continuing

ment: 63553N Title: Surface Anti-Submarine Warfare
Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

D BACKGROUND AND DESCRIPTION: This program focuses on advanced development of acoustic sensors for future surface he improvement of surface ship anti-submarine warfare performance. The emphasis is on upgrading current and al surface ship sensors and reducing or cancelling surface ship self and radiated noise in order to improve sensor e and reduce counterdetection ability, respectively. These developmental efforts are required to provide the cal base and product improvements necessary for countering current and projected improvements in Soviet submarine s and to ensure an effective surface anti-submarine warfare force through the 1990s. This program element consists of ing projects: Project S0220, Advanced Surface Sonar - there is a requirement for the development of system and improvements which will be applicable to existing and future surface ASW sensors. Improvements addressed by this lude]to assist in managing vast amounts of passive contact data generated by towed improved hull mounted sonars,]for reduction in command/operator information tive sonar improvement to improve performance] and for future sive search and detection improvements. Project S0229, Surface Ship Silencing - this program was initiated to develop ive means for reducing the sonar self noise and radiated noise on surface ships to improve their anti-submarine warfare e and their survivability, respectively, particularly at higher operating speeds. Reductions in sonar self noise, nd machinery radiated noise will enable optimum utilization of present and future acoustic sensor systems while also e counter-detectability of the ships involved. Adaptation of technology developed in the Submarine Silencing Program and commonality across ship classes are stressed.

ACTIVITIES: Program Element 62543N, Ships, Submarines and Boats Technology - Development of acoustic silencing Program Element 25634N, Submarine Silencing - Development of noise reduction technology for submarines; Program 59N, Acoustic Search Sensors (Advanced) - Development of acoustic sensors; Program Element tical Towed Array Sonar - Development of towed array sensors for surface ship tactical use; Program Element 63504N, Sonar Development (Advanced) - Development of techniques and Program Element 25623N, p Sonar Modernization - Development of preplanned product improvements for the hull mounted active/passive sonar SQS-53.

RFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; David W. Taylor Naval Ship Research and Development derock MD; Naval Underwater Systems Center, Newport, RI, and New London, CT; Philadelphia Naval Shipyard, Philadelphia, urface Weapons Center, White Oak, Silver Spring, MD; Naval Research Laboratory, Washington, DC. Contractor: Applied boratory, Pennsylvania State University, State College, PA; EG&G Washington Analytical Services Center, Rockville, MD; gton Operations, McLean, VA; Analysis and Technology, North Stonington, CT; Sanders Associates, Nashua, NH; Unitech, n, TX; Gould, Inc., Glen Burnie, MD; Rockwell International, Anaheim, CA; EDO Corporation, New York, NY., EPOCH , Gaithersburg, MD.

Program Element: 63553N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0220 (Advanced Surface Sonar) - Mission and conceptual studies initiated under Project S0208 identified a sonar as the most promising acoustic sensor for high performance ships. The design and fabrication of this advanced development model was completed under project S0208 during FY 1979. During FY 1980, the at-sea test and evaluation of the advanced development model was successfully completed. Upon completion of the data analysis, the sonar project was terminated pending identification of a surface ship requirement. The following was also completed under project S0220:

a. Design, fabrication and laboratory testing of the improvements.

b. Design and fabrication of the Advanced Development Model for the AN/SQR-18A.

c. Two active subsystem improvements were initiated which would markedly improve active sonar performance. They were the AN/SQS-53 and the FFG-7 class ships.

Project S0229 (Surface Ship Silencing) - FF-1052 class diagnostics were conducted at sea and approved for class installation. An FF-1052 class prototype *were designed and evaluated at sea.* A decision was made in FY 1979 to divide the effort into three separate efforts related to the AN/SQR-18A, AN/SQR-17 and the AN/SQS-26CX in order to accelerate fleet introduction and reduce costs. Engineering development model testing of the AN/SQR-17 has been completed and the AN/SQR-18A and AN/SQS-26CX design efforts are complete. Testing of the FF-1052 class have been satisfactorily completed. Design studies were completed for the following additional major FF-1052 class quieting improvements:

2. (U) FY 1982 Program: Project S0220 (Advanced Surface Sonar) - Program accomplishments in FY 1982 include: shipboard installation and testing of an experimental Removal of shipboard experimental equipment for and orderly termination of the program. Project S0229, (Surface Ship Silencing) - Development and evaluation of the AN/SQS-26 CX and the AN/SQR-18A engineering development models will be completed. FF-1052 class improvements will be evaluated at sea. FF-1052 class design efforts will be completed for FY 1983 at sea evaluation. FFG-7 class diagnostics will be conducted and initial DD-963 class design studies will be initiated. DD-963 diagnostic planning will be initiated.

Program Element: 63553N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Surface Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Project S0229 (Surface Ship Silencing) - At-sea evaluations will be conducted on FF-1052 class DD-963 class design studies will be continued and application of FF-1052 class quieting products on DD-963 class ships will be demonstrated at-sea. Selected FF-1052 class and DD-963 class quieting design studies will be continued based on at-sea product evaluations and diagnostic testing results. FFG-7 class diagnostics will be completed and FFG-7 class design studies will be initiated. Application to other classes will be initiated.

4. (U) FY 1984 Planned Program: Project S0229 (Surface Ship Silencing) - Application of FF-1052 class quieting products to DD-963 and FFG-7 classes will be continued. DD-963 and FFG-7 class major noise source quieting design studies will be completed. Initial FFG-7 and DD-963 class at-sea evaluation of tailored products will be conducted. Application of the project to other surface combatants will be initiated.

5. (U) Program to Completion: Project S0229 (Surface Ship Silencing) is a continuing program.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63561N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarines (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	34,079	53,563	44,413	54,342	Continuing	Continuing
S0205	Submarine Atmosphere Control System	3,848	7,023	7,522	4,792	9,600	53,747
S0206	Submarine Ejection System	2,272	2,634	1,972	0	0	21,216
S0207	Advanced Submarine Control	2,134	2,696	2,511	2,444	14,245	38,899
S0344	Submarine Auxiliaries	973	3,018	2,461	2,428	Continuing	Continuing
S0348	Deep Components	981	5,508	1,981	2,470	46,717	70,641
S0364	Submarine Damage Prevention	*	1,073	1,188	1,615	Continuing	Continuing
S0923	Improved Performance Machinery	19,302	22,991	21,893	30,696	Continuing	Continuing
S0971	Submarine Shock	1,472	2,446	2,882	5,643	110,183	129,100
S1122	Titanium-100	1,968	2,700	483	451	9,786	15,856
S1266	Submarine Propellers	1,129	3,474	1,520	3,803	Continuing	Continuing

Sub-Tasks and Quantities of test items associated with the above project listing are too numerous to tabulate.
*Funded under Program Element 63514N, Shipboard Damage Control in FY 1981 and prior years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: S0205 (Submarine Atmosphere Control) is developing systems for control of atmosphere conditions. S0206 (Submarine Ejection) is developing a polymer system for speed increases and quieting. S0207 (Advanced Submarine Control) (ASCOP) will increase safety, effectiveness and speed by development of advanced control systems. S0344 (Submarine Auxiliaries) will develop improved auxiliary machinery. S0348 (Deep Components) is the effort to extend operational depths of future submarines. S0364 (Submarine Damage Prevention) addresses fire prevention, detection, containment and extinguishment plus the development of damage control equipment and systems unique to submarines. S0923 (Improved Performance Machinery) is to increase power density in future submarines by minimizing the size of the propulsion plant. S0971 (Submarine Shock) will enable the construction of submarines which fully meet Navy shock hardening goals. S1122 (Titanium-100) will transition laboratory titanium technology to industry to provide Navy titanium hull requirements as a technology option. S1266 (Submarine Propellers) will resolve existing and prevent future problems in submarine propeller design, manufacture and performance.

Program Element: 63561N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarines (Advanced)
Budget Activity: 4 - Tactical Programs

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0205 (Submarine Atmosphere Control) - Complete fabrication and initiate laboratory evaluation of prototype carbon dioxide removal system. Complete laboratory evaluation/testing of solid polymer electrolyte oxygen generator. Continue development and ships testing of paints for underway use. Install/initiate operational evaluation and continue laboratory testing of second full scale unit. Install central atmosphere monitor on selected hull and initiate operational evaluation. S0206 (Submarine Ejection System) - Conduct shipboard evaluation. S0207 (Advanced Submarine Control) - Continue installation of split sternplane system. Continue parametric testing using submarine control system test vehicle. Continue development of control system design tools. S0344 (Submarine Auxiliaries) - Continue development of advanced battery system, high temperature distiller, reverse osmosis desalinator, rotary high pressure compressor, arc fault detector, depth detector, and machinery condition monitor. S0348 (Deep Components) - Continue development of shaft seals, sea connected piping, emergency deballasting system, heat exchangers, main seawater and high pressure head pumps, torpedo tube, and hull and backup valves. Decrease in funding from FY 1982 to FY 1983 reflects two-year slip in program completion. S0364 (Submarine Damage Prevention) - Continue development of fire suppression techniques and of smoke removal device for submarines. Demonstrate vulnerability of hull insulation to fuel fires. Place higher emphasis on search for fire resistant material. Continue work on reducing electrical fire hazards. Conduct evaluation of fresh water aerosol and aqueous film-forming foam fire supression systems. S0923 (Improved Performance Machinery) - Continue design and begin construction of component prototypes. Complete development of sound isolation concepts and begin model construction. Decrement in funding from FY 1982 to FY 1983 reflects minor schedule revisions. S0971 (Submarine Shock) - Continue improvement of design and test methods. Continue shock and underwater explosion tests of equipments and structures in submarine shock test vehicles. Continue to develop hardening alteration and recertification procedures for/to be shock tested. Fabricate 1/6 scale submarine hull models, conduct analysis for pre-test predictions, and conduct shallow underwater explosion tests. S1122 (Titanium-100) - Complete procurement of Ti-100 plate material and initiate base material qualification. Decrease in funding from FY 1982 to FY 1983 reflects three-year interruption of planned contractor activity. S1266 (Submarine Propellers) - Procure long lead time items required for the development of a large scale vehicle for propeller evaluations. Continue development of improved propeller concepts and improved manufacturing methods. Decrease in funding from FY 1982 to FY 1983 reflects completion of much of the initial study effort. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated except for projects S0344 (Submarine Auxiliaries), S0364 (Submarine Damage Prevention), S0923 (Improved Performance Machinery) and S1266 (Submarine Propellers) which are continuing programs and for which this pertains through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: (1) The FY 1981 total estimate has increased by 1,629 as the net result of below threshold reprogramming to support increased competition in the advanced ship service turbine generator design effort of project S0923 (+1,997) and minor inflation adjustments to all projects (totalling -368). (2) The FY 1982 total estimate has decreased by 6,716 as the combined result of restructuring in project S0923 (-5,213) and minor revisions of all other estimates (totalling -1,503). (3) The FY 1983 total estimate has decreased by 11,955 as the net result of the following: Restructuring of the Submarine Atmosphere Control program (project S0205), which adds one year to

completion (-850); Addition of FY 1983 funding (+1,972) to the Submarine Ejection program (project S0206) due to delay in overhaul of the test ship; Program stretchout in the Advanced Submarine Control program (project S0207; -1,103); Revision of estimates for the Submarine Auxiliaries Program (project S0344; -87); Two-year slippage in completion of the Deep Components program (project S0348; -1,580); Revision of the estimate for the Submarine Damage Prevention program (project S0364; -36); Restructuring of the Improved Performance Machinery (project S0923) and Submarine Shock (project S0971) programs (-7,314 and -91, respectively); Interruption of contractor participation in the Titanium-100 program (project S1122; -2,007). (4) Total Costs estimated in the FY 1982 Descriptive Summary have changed as follows: The total estimated cost of the Submarine Atmosphere Control program (project S0205) has decreased by 1,381 as the net result of the above mentioned annual changes (-1,202) and outyear changes (-179); The total estimated cost of the Submarine Ejection program (project S0206) has increased by 1,836 due to the above mentioned annual changes; The total estimated cost of the Advanced Submarine Control program (project S0207) has increased by 1,200 as the net result of the previously mentioned annual changes (-1,199) and outyear changes including program stretchout (+2,399); The total estimated cost of the Deep Components program (project S0348) has increased by $8,000, due to the previously mentioned annual changes (-1,814) and outyear changes including two-year extension of the program (+9,814); The total cost of the Improved Performance Machinery program (project S0923) has increased by 76,317 (to a current total of 395,374) due to the above mentioned annual changes (-8,729), revision of contractor and in-house estimates for FY 1984 through FY 1988 (+83,050) and other outyear adjustments (+1,996). "Continuing" has been entered as the total estimated cost of this program in view of major redirection which is expected to result from FY 1984-1985 program technology assessment. (See "Program to Completion" (Paragraph 5 of this Descriptive Summary).) The total estimated cost of the Submarine Shock program (project S0971) has increased by 52,132 due to addition of further [illegible] items to be shock qualified and deletion of planning for full-scale shock trials of an ex-SSBN 598 class submarine; The total estimated cost of the Titanium-100 program (project S1122) has decreased by 468 as the net result of the above mentioned annual changes (-2,140) and resumption of planned contractor activity in FY 1985 and later (+1,672); The total estimated cost of the Submarine Propeller program (project S1266) has been shown as "continuing" due to restructuring.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	42,337	32,450	60,279	56,368	Continuing	Continuing
S0205	Submarine Atmosphere Control System	5,158	3,893	7,330	8,372	14,571	55,128
S0206	Submarine Ejection System	5,843	2,292	2,750	0	0	19,380
S0207	Advanced Submarine Control Program	4,719	2,165	2,761	3,614	14,290	37,699
S0344	Submarine Auxiliaries	3,011	990	3,158	2,548	Continuing	Continuing
S0348	Deep Components	6,372	988	5,735	3,561	39,373	62,641
S0364	Submarine Damage Prevention	*	*	1,118	1,224	Continuing	Continuing

Program Element: 63561N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarines (Advanced)
Budget Activity: 4 - Tactical Programs

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
S0923	Improved Performance Machinery	12,857	17,504	28,204	29,207	224,514	319,057
S0971	Submarine Shock	3,909	1,496	2,855	2,973	63,170	76,968
S1122	Titanium-100	468	1,984	2,817	2,490	8,565	16,324
S1266	Submarine Propellers	0	1,138	3,551	2,379	21,006	28,074

*Funded under Program Element 63514N, Shipboard Damage Control in FY 1981 and prior years.

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 63561N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarines (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0205 Submarine Atmosphere Control System - The present Atmosphere Control System on nuclear submarines was put together by adapting individual existing commercial equipments and processes available in the 1950s. The net result has led to numerous deficiencies. A controlled atmosphere is essential to the mission of nuclear submarines. Maintaining an adequate atmosphere during long submergence involves processing of air to achieve temperature and humidity control; oxygen replenishment; removal of carbon dioxide, carbon monoxide and hydrogen; and atmosphere constituent sensing and monitoring. The Advanced Submarine Atmosphere Control System is designed to eliminate all known deficiencies, will be more reliable and maintainable and will meet the latest design performance requirements established by Operational Requirement SL-67R1. Savings in space, weight and power requirements will result from this development. S0206 Submarine Ejection System - This project will develop and evaluate a polymer slurry ejection system capable of providing a burst speed increase as well as a reduction in sonar self noise at lesser ejection rates. Design requirements are to be developed for system incorporation into future attack submarine designs. S0207 Advanced Submarine Control Program - This program is directed toward improving the operational safety and combat effectiveness of submarines through the improvement of control system performance. These improvements will be made by better definition of performance criteria, better modeling of components and systems performance, better integration of the design process and, finally, improved prototype hardware. Such hardware will be designed, developed and tested for eventual use in new submarine programs. S0344 Submarine Auxiliaries - The objective of this program is to develop standardized auxiliary machinery components and systems possessing improved effectiveness, reliability and maintainability. Goals include use of modular subsystem designs to achieve reduction in forced outages, maintenance man-hours at sea and improved monitoring capability. S0348 Deep Components - Beginning in the early 1960s the Navy initiated development of a higher strength hull steel to permit designing combatant submarines for deeper depths. Increased submarine operating depth will increase the safe operating envelope for weapon evasion and casualty control, increase hull strength for improved resistance to weapon damage, decrease non-acoustic signature effects and provide a more favorable sonar environment. This project will complement the HY-130 Steel program, which is providing a stronger hull material for combatant submarines. The project will examine all components and equipments subjected to submergence depth sea pressure, develop and test new components using different materials, if required, and will certify these components for use. S0364 Submarine Damage Prevention - This project addresses fire prevention, detection, containment and extinguishment plus the development of damage control equipment and systems unique to submarines. FY 1981 and prior efforts were funded under Program Element 63514N, Shipboard Damage Control. S0923 Improved Performance Machinery - The objectives of this project are to increase power density in future attack submarines by reducing the size and weight of the steam propulsion plant and associated auxiliary equipments while maintaining current standards of quieting, reliability, shock hardening, safety and maintainability. The approach is to investigate existing technology for near-term payoff, low risk gains and investigate longer term developments which may permit significant long term gains. This program does not include nuclear reactor or associated primary plant components. S0971 Submarine Shock - Shock testing of submarines, models, and equipments shows a wide disparity in the shock resistance of shock qualified items as opposed to those items which remain unqualified. Unqualified items continue to be installed in new construction ships resulting in an imbalance in shock resistance among the various systems and components and a reduced capability of the submarine to accomplish its mission after exposure to shock. The objective of this task is to improve submarine mission keeping capability in a combat environment.

Program Element: 63561N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarines (Advanced)
Budget Activity: 4 - Tactical Programs

S1122 Titanium-100 - A successful demonstration of the feasibility of Titanium-100 as a submarine hull material was completed under the Materials Exploratory Development Plan (Program Element 62761N). Titanium is the only viable material which can be used as a non-magnetic material. This program will provide for technology transfer of laboratory developed Titanium-100 gas metal arc welding fabrication to industry so that the Navy construction requirements will be available for advanced development structural certification programs. Program will demonstrate, through use of fabricators and producers, that the Navy requirements and developed procedures are reasonable and acceptable in a shipyard, and provide an industrial base for subsequent model fabrication and acceptance of Navy specifications. S1266 Submarine Propellers - The Navy's current capability to design and manufacture high performance submarine propellers which meet planned propulsion performance and acoustic silencing criteria is less than satisfactory. Today, the radiated noise from submarine propellers is a major contributor to detection by threat sonar platforms and can compromise our ship weapon system and operational effectiveness. Correction of design, performance prediction, and manufacture problems currently requires trial and error evaluation on full scale submarines. In order to reduce time required to correct current propeller problems and to reduce time required to introduce new propeller concepts into the Fleet, a large scale submarine model will be used. Large variations in acoustic performance also exist between propellers built to the same tolerances by the same manufacturer. By use of this model the program will develop an improved capability to predict performance, to design for high efficiency and low noise, to manufacture within stringent tolerances and to demonstrate improved performance concepts.

(U) RELATED ACTIVITIES: Project S0205 (Submarine Atmosphere Control Systems) receives technology in the areas of oxygen generation from Program Element 62543N, Ships, Submarines and Boats Technology, Project SF43-433, Auxiliary Machinery/Equipment. Project S0206 (Submarine Ejection System) has no related activities. Project S0207 (Advanced Submarine Control Program) received initial study support for its requirements from Program Element 63564N, project S0408, Ship Concept Formulation effort, and is coordinated with Program Element 64561N, project S0411, Submarine Drag Reduction. Project S0344 (Submarine Auxiliaries) receives technology development in the areas of compressors, distillers and fiber optic monitors from Program Element 62543N, SF43-433, Auxiliary Machinery/Equipment. Project S0348 (Deep Components) utilizes a HY-130 hull baseline, complements Program Element 63531N, project S0385, HY-130 Steel, provides technology inputs in the areas of piping, heat exchangers and fouling protection to project S0923, Improved Performance Machinery and reviews and utilizes technology from project S0971, Submarine Shock. Project S0364 (Submarine Damage Prevention) receives technology support from Program Element 62634N, Ships, Submarines and Boats Technology and is coordinated with future attack submarine design efforts under Program Element 63569N, Attack Submarine Development. Project S0923 (Improved Performance Machinery) provides equipment and system design information to Program Element 62543N, Ships, Submarines and Boats Technology, Program Element 63564N, project S0408, Ship Concept Formulation and Program Element 63588N, Ballistic Missile Submarine Subsystem Technology program, project S0001; reviews and utilizes material developed by project S0348, Deep Components; monitors developments for possible program inputs from project S0344, Submarine Auxiliaries and includes the latest shock information and data developed under project S0971, Submarine Shock. Project S0971 (Submarine Shock) uses the technology developed by Program Element 62543N, Ships, Submarines and Boats Technology, Task SF43-451-594, Submarine Combatant Protection and Task SF92-422-592, Submarine Structure. Shock is an important requirement in the following programs which involve developing submarine systems with improved performance at minimum cost: Program Element

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63569N, Attack Submarine Development; Program Element 63588N, Ballistic Missile Submarine Subsystem Technology; and projects S0348 (Deep Components) and S0923 (Improved Performance Machinery) of this program element. Project S1122 Titanium-100 is based on technology provided by Program Element 62761N, Tasks SF61-541-591, Materials for Submarines and SF61-541-504, Titanium Alloy System for Cost Reduction. The Titanium-100 program provides technology for the Deep Components program and the Improved Performance Machinery program (S0348 and S0923, respectively). Project S1266 (Submarine Propellers) is coordinated with Program Element 25634N, project S0218, Submarine Silencing; Program Element 64561N, project S0411, Submarine Drag Reduction; Program Element 62543N, SF43-432-502, Submarine Propulsor Technology; and Program Element 63728N, project Z1050, Manufacturing Technology.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Research Laboratory, Washington, DC; Naval Sea Systems Command, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Coastal Systems Center, Panama City, FL; Philadelphia Naval Shipyard, Philadelphia, PA; Puget Sound Naval Shipyard, Bremerton, WA; Naval Surface Weapons Center, Dahlgren, VA; Mare Island Naval Shipyard, Vallejo, CA; Naval Ship Systems Engineering Station, Philadelphia, PA; Supervisor of Shipbuilding, Conversion and Repair, USN, Brooklyn, NY; Supervisor of Shipbuilding, Conversion and Repair, USN, San Francisco, CA. Contractors: Westinghouse Astronuclear, Pittsburgh, PA; Perkin-Elmer Corporation, Pomona, CA; General Electric, Lynn, MA, Fitchburg, MA, Binghamton, NY and Schenectady, NY; Hamilton Standard, Windsor Locks, CT; General Dynamics, Electric Boat Division, Groton, CT; Rockwell International Corporation, Autonetics Division, Anaheim, CA; Operations Research, Incorporated, Silver Spring, MD; Systems Control, Incorporated, Palo Alto, CA; Analytical Science Corporation, Boston, MA; Charles Stark Draper Laboratory, Incorporated, Cambridge, MA; Lockheed Missiles and Space Company, Incorporated, Sunnyvale, CA; Newport News Shipbuilding, Newport News, VA; Ingalls Shipbuilding Company, Pascagoula, MS; Westinghouse Electric Corporation, Sunnyvale, CA and Pittsburgh, PA; Bolt, Beranek and Newman, Boston MA; DeLaval Corporation, Trenton, NJ; Garrett Corporation, AiResearch Manufacturing Division, Torrance, CA; Western Gear Corporation, Applied Technology Division, Industry, CA; Curtiss-Wright Corporation, Woodbridge, NJ; Cutler-Hammer Corporation, Milwaukee, WI; Gould Corporation, Tucker, GA; Stewart and Stevenson, Houston, TX; Tetra-Tech Corporation, Pasadena, CA; Weidlinger Associates, New York, NY; M&T Company, King of Prussia, PA; Applied Research Laboratory, Pennsylvania State University, State College, PA; Bendix Aerospace Division, Ann Arbor, MI; Desmatics, State College, PA; ENSCI, College Park, MD; Gibbs & Cox Inc., Arlington, VA; NKF Engineering Associates, Arlington, VA; Babcock and Wilcox, Nuclear Equipment Division, Barberton, OH; RMI Company, Niles, OH; Astrometallurgical Corporation, Wooster, OH. Others to be selected.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0205 Submarine Atmosphere Control Systems - This program began in FY 1975. Completed cooperative and jointly-sponsored Navy/National Aeronautics and Space Administration trade-off study identifying most promising life support system development candidates for submarines. Completed development and ship evaluation of modification package necessary to modify onboard carbon dioxide scrubbers to meet near-term 0.5% carbon dioxide requirement. Completed comparative trade-off studies identifying most promising carbon dioxide removal processes capable of maintaining a 0.2% carbon dioxide concentration level (far-term requirement); completed selected system scale-up experiments using liquid monoethanolamine absorbent and

solicited proposals for full scale carbon dioxide removal prototype system design, construction and evaluation. Awarded prototype system development contracts for design fabrication and test and evaluation of an oxygen generator using solid polymer electrolyte. A 20 module thermo-electric air conditioner system was designed, fabricated and installed in USS DOLPHIN (AGSS 555) for evaluation. Completed design fabrication and commenced vendor testing of three full scale 100 cell solid polymer electrolyte module oxygen generator assemblies. Completed design and initiated fabrication of full scale military specification prototype. Tests of prototype thermo-electric cooling modules, shipboard installation in USS DOLPHIN, technical evaluation and operational evaluation were all successfully completed. Awarded prototype development contracts for design, construction and evaluation of a reprogrammable scanning-type mass spectrometer central atmosphere analyzer which will be programmed initially to monitor 14 constituents and can be programmed in the future to monitor additional constituents of interest as they arise. Completed design of two technically competitive atmosphere analyzer prototypes and fabrication of lead design military specification prototype. Completed laboratory evaluations of candidate carbons and modified procurement specification to assure providing Fleet with most effective gas absorption carbons available for use in removing trace contaminants. Continued a material screening and evaluation program to prevent use of materials which may give off undesirable or toxic gases to a closed submarine atmosphere. Initiated development of paints permitting underway use in submarines and non-intumescent general purpose paint for habitability spaces metallic surfaces. Completed a trade-off study to identify candidate systems required to eliminate the need for] completed selected laboratory scale parametric experiments, design, fabrication and 3,000 hours of testing of full scale preprototype non-military-specification system. Completed design of military specification prototype and ship alteration package for installation on selected hull. Identified potential concepts for emergency carbon monoxide removal under low or no electrical power conditions. S0206 Submarine Ejection System - This development was started in 1976. System components were developed, evaluated individually, and tested as a full scale land-based system mockup. Performance predictions and ship system compatibility assessment have been completed. Trial quantities of polymer slurry have been produced and a polymer slurry ejection system installed for evaluation on an attack submarine. S0207 Advanced Submarine Control Program - Working plans for a split sternplane system on board SSN 718 were completed. Advanced procurements are underway. The first increment of a basic design tool has been completed. Work was started on a more detailed design tool. An open water submarine test vehicle was built and delivered to the Naval Coastal Systems Center, Panama City, Florida. Vehicle debugging has been completed. A human operator model was developed for use in designing an advanced control station. Progress has been made in rationalizing control system design criteria. S0344 Submarine Auxiliaries - New start in FY 1980. Awarded contracts for two parallel efforts to increase the capacity of lead-acid battery systems by 20% and extend the life from five to ten years. Completed the design and fabrication of prototype lead-acid cells and two designs of improved jar and covers. Awarded contracts for the development of parallel efforts for nickel-iron and nickel-cadmium battery systems to increase the capacity] Completed designs of prototype nickel-iron and nickel-cadmium feasibility cells. Completed computer modeling of a cup and cylinder configuration for a rotary, water-lubricated air compressor. Completed the specifications for a 2000 gallon per day reverse osmosis desalinator and a solid state depth detector. Completed preliminary submarine tender evaluation of a fiber optic instrument to insure proper bearing installation. Modifications are required to manually set speed ratio ranges for lightly-loaded bearings. Selected as the two detector concepts for the arcing fault detector for submarine electrical power switchboards. Fabricated and laboratory-tested preprototype sensors for alternating current and direct

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current arcing faults. S0348 Deep Components - This program was begun in FY 1978 with initiation of work on the four specific Deep Components efforts identified as critical, requiring highest development risk and long development time. Efforts in these areas were as follows: Shaft seal development stressed improved materials and seal configurations. Sea connected piping systems efforts concentrated on fabrication technology, fouling control and casting techniques for improved higher strength copper/nickel alloys and Inconel alloys. Emergency main deballasting efforts centered about recovery characteristics studies performed to permit trade-off comparison of present type systems which could result in unacceptably large and heavy system designs, versus systems requiring development of a compressor. Also, a study to assess the possible use of chemical deballasting to assist both candidates was completed. The heat exchanger effort focused on use of titanium materials development and improved fabrication techniques which offer benefits of reduced weight and volume and permit use of higher fluid velocities. Efforts include development of balance between increased noise as velocities increase and decreased size; and development of an anti-fouling prototype subsystem. Accomplishments include the following: Identification and evaluation of improved shaft seal fabrication materials coupled with ten shaft seal design concepts. Selection of four concepts for preliminary design (balanced face seal, buffered seal, circumferential and staged packing) and initiated preliminary design of the staged packing and circumferential concepts. Initiated design modifications for a deep depth seal qualification test machine. Initiated development of CA719 (chrome modified copper nickel) and Inconel 625 piping components; refined hull deflection analysis and developed stress indices evaluations for optimum piping structures; developed welding and fabrication procedures for CA719 and In 625 components; initiated billet and forging optimization techniques for CA719 and In 625; developed military specifications for component procurements and initiated procurement of In 625 test piping assemblies. Selected In 625 as the lead piping material and ceased work on CA719. Emergency Main Ballast Tank parametric studies comparing recovery capabilities for systems were completed, and an increased volume, system with a higher capacity blow valve was chosen as prime certification candidate. Experimental verification of submarine rise rates for system was completed, and design of higher capacity blow valve initiated. Completed construction of piping component pier-side field test assemblies and initiated evaluation of two fouling protection system candidates for titanium tubing and Inconel systems. Initiated construction of deep ocean fouling test facility. Developed titanium tube rolling and welding procedures for tubes and tubesheets and developed bi-metallic welding procedures. Completed test evaluation of TRIDENT thrust bearing for and demonstrated start-up adequacy. Completed main seawater pump bearing design study, identified motor bearing size requirements and initiated procurement of motor bearings for evaluation. Completed torpedo tube deflection analysis model development. Developed trim and drain pump requirements. S0364 Submarine Damage Prevention - FY 1981 and prior efforts were funded under Program Element 63514N, Shipboard Damage Control. S0923 Improved Performance Machinery - This program was begun in 1978. Completed preliminary identification of potential system component and technology development areas. Completed detailed assessments of industrial and technological capability to support weight and size reductions in propulsion, electrical power and engine room cooling water systems. Completed at-sea tests of existing main propulsion unit sound isolation systems. Completed broad canvassing of industry in support of the above tasks. Completed specifications for and initiated proposal solicitations for advanced design turbines, reduction gears, condensers, heat exchangers, electrical generators, motors, switchboards, circuit breakers and associated supports and foundations. Completed component preliminary design contract awards. Selected Naval Ship System Engineering Station, Philadelphia, for

integrated system test site and initiated site planning effort. S0971 Submarine Shock - This project started in FY 1979. Evaluated shock qualification procedures. Identified 500 remaining unqualified items. Planned program is to evaluate all items leading to shock qualification. Developed schedules and cost estimates. Shock tested 70 of these unqualified items. Developed and field tested modular recorder for submarine shock test vehicle and ship shock tests. Predicted response of 1/9 scale hull models and conducted shallow and deep water explosion tests. Designed and procured steel for 1/6 scale models. Studied need for shock tests submarine and prepared draft test plan. Conducted two series of Submarine Shock Test Vehicle shock tests. Based upon analysis and shock testing, determined that revised shock requirements should save 60 tons in future attack submarine design. Developed shock design criteria for weapons stowed in torpedo tubes. S1122 Titanium-100 - This project started in FY 1980. Planned program to construct Contract awarded to RMI Company for Titanium-100 plate material. Contracts awarded to Babcock and Wilcox and Lockheed Missile and Space Company, Incorporated to conduct technology transfer of Navy laboratory-developed gas metal-arc welding of titanium and construction of fabrication models. S1266 Submarine Propellers - Consolidated existing knowledge of propeller problems. Conducted feasibility study and preliminary design for a large scale vehicle and large scale model wake measurements. The acquisition plan for the Large Scale Vehicle has been approved. Conducted evaluation of alternative manufacturing techniques. Initiated trade-off studies on alternative propulsor concepts for improved acoustic and powering performance.

2. (U) FY 1982 Program: S0205 Submarine Atmosphere Control - Obtain Approval for Service Use for thermoelectric air conditioning system. Complete fabrication of full scale military specification prototype and laboratory evaluations of solid polymer electrolyte oxygen generator, and central atmosphere analyzer. Complete fabrication and initiate laboratory evaluation of full scale military specification obtain approval of ship alteration package and integrated logistics support certification and procure ship modification materials. Continue development and initiate ship testing of intumescent and non-intumescent (non-swelling) paints for underway use; and complete materials control program. Further efforts on emergency carbon monoxide and smoke removal have been deferred. S0206 Submarine Ejection System - At-sea evaluation of the installed ejection system on an attack submarine will be conducted followed by data analysis and reporting. Slurry production will be initiated for FY 1983 trials. S0207 Advanced Submarine Control - Installation of a split sternplane system on SSN 718 will be made. Advanced procurements will be completed. Begin operation of submarine control system test vehicle. Complete development of basic design tool. Improve equations of motion and continue development of an advanced control system design tool. S0344 Submarine Auxiliaries - Complete fabrication of full scale prototype lead-acid battery cells and initiate performance and accelerated life testing. Complete design of full scale size nickel-iron or nickel-cadmium battery system. Complete breadboard testing of arcing fault detector in TRIDENT S8G nuclear prototype and award contract for six prototype assemblies. Solicit proposal and award contract for development, test and evaluation of a 2000 gallon per day, reverse osmosis desalinator, and for design of the high pressure stage of a compressor. Continue bearing service life tests and development of fiber optic machinery monitoring discriminants and conduct terminal evaluation of fiber optic bearing monitor at shipyard and tender sites. Complete development of bearing noise rejection criteria with in situ fiber

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optic readings. S0348 Deep Components - Complete preliminary design of staged packing and circumferential shaft seal configuration alternatives, initiate preliminary design of buffered and balanced face seal concepts, procure materials for seal fabrication and evaluation and complete construction of seal qualification test machine. Continue piping system experimental stress factor and hull deflection analysis, fabricate piping assemblies and initiate evaluation. Initiate piping component burst qualification tests, continue fouling protection system pier-side field test evaluation and initiate deep ocean fouling tests. Initiate fabrication of titanium heat exchanger and main sea water condenser preliminary design. Complete fabrication of emergency deballasting high capacity blow valve. Initiate laboratory testing of main sea water pump large size motor bearings and construct motor. Develop detailed test plan and procure torpedo tube deflection measurement instrumentation and initiate installation on submarine. S0364 Submarine Damage Prevention - Program transfers to this Program Element from Program Element 63514N, Shipboard Damage Control. Continue development of fire suppression techniques and agents and of smoke removal device for submarines. S0923 Improved Performance Machinery - Continue design/technology development under contracts awarded for components selected in FY 1979 and FY 1980. Complete preliminary design of advanced propulsion turbines/reduction gears, advanced condenser, heat exchanger and switchboard. Continue ship service turbogenerator prototype construction. Start switchboard construction. Contractors complete development of alternate sound isolation system designs. Continue integrated system test site planning and engineering effort and initiate site, system and foundation design. S0971 Submarine Shock - Continue to develop improved shock design and test criteria. Continue shock and underwater explosion tests of Submarine Shock Test Vehicles. Complete analysis and reporting on shallow and deep underwater explosion tests against 1/9 scale model. Continue development of hardening fixes and recertification procedures. Continue development of hull dynamic design procedure based on shallow and deep test data and analysis. Initiate fabrication of 1/6 scale hull models. S1122 Titanium-100 - Phase I of the fabrication demonstration contracts has been initiated. The Navy laboratory developed gas metal-arc welding technology will be transferred to industrial fabricators through written documentation of procedures and on-site training. The contractors will develop production-oriented procedures applicable to shipyard construction. Detailed drawings and fabrication plans will be completed by each fabricator. S1266 Submarine Propellers - Continue design of Large Scale Vehicle and commence fabrication; refine analytical models; develop wake measurement techniques and equipment.

3. (U) FY 1983 Planned Program: S0205 Submarine Atmosphere Control - Install [redacted] system on [redacted] initiate operational evaluation and continue laboratory testing of second full scale unit. Complete design and fabrication and initiate laboratory evaluation of 0.2% carbon dioxide scrubber. Install central atmosphere monitor on selected hull after obtaining integrated logistic support certification and initiate operational evaluation. Complete laboratory evaluation/testing of solid polymer oxygen generator and obtain approval for ship alteration package required for ship evaluation. Continue ship tests of interior intumescent and non-intumescent paint. S0206 Submarine Ejection System - Conduct [redacted] evaluation. Provide system design and requirements for future design attack submarines. Restore test ship to class configuration. Program completes. S0207 Advanced Submarine Control Program - Continue installation of split sternplane system on SSN 718. Continue parametric test program using submarine control system test vehicle. Begin feasibility studies of best control systems found in control system test vehicle tests. Continue development of integrated control system design tools. S0344 Submarine Auxiliaries - Complete accelerated life testing of full scale prototype lead acid batteries and continue long life test. Fabricate full size prototype

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on or nickel-cadmium battery system, and initiate cell performance and life tests. Complete ship installation and evaluation of arcing fault detector system and initiate operational evaluation. Defer development of reverse osmosis ır, water lubricated rotary high pressure air compressor and fiber optic bearing performance S0348 Deep Components - Continue laboratory experimental evaluation of staged packing and circumferential shaft seal ry design candidates and complete preliminary design and initiate laboratory experimental evaluation of buffered and face seal concepts. Continue evaluation of full scale mock-up of piping system components. Continue piping system tal stress factor and hull deflection analysis. Complete fouling protection system pier-side field test and deep ocean ıations, and select design of fouling protection system components for certification evaluation. Continue main sea water design and complete fabrication of titanium heat exchanger. Complete laboratory testing of main sea water pump large- r bearings. Initiate testing on SSN 688 class ship to evaluate torpedo tube predictive deflection model. Decrease in rom FY 1982 to FY 1983 reflects reduction of FY 1983 activity and two year program stretchout. S0364 Submarine Damage n - Continue development of fire suppression techniques and agents and of smoke removal device for submarines. Place phasis on search for fire resistant material. Continue work on reducing electrical fire hazards. Conduct evaluation of water aerosol and aqueous film-forming foam fire suppression systems. S0923 Improved Performance Machinery - Proceed :ory test of ship service turbogenerator prototype; begin construction of advanced condenser, heat exchanger, motor , advanced ship service turbogenerator, motor and pump prototypes. Continue design of advanced propulsion turbines/ gears. Begin model construction/test of optimum sound isolation system(s). Continue design for necessary integrated st site modifications and begin site preparation. S0971-Submarine Shock - Continue to develop improved shock design and teria. Continue shock and underwater explosion tests of submarine equipments and structures in Submarine Shock Test , Continue development of hardening alterations and recertification requirements ship to be shock Continue fabrication of 1/6 scale hull models. S1122 Titanium 100 - Interruption of contractor participation in this educes the FY 1983 through FY 1985 effort to maintenance (storage) and characterization of material received under prior s, and is the reason for the decrease in funding from FY 1982 to FY 1983. S1266 Submarine Propellers - Develop wake ınt techniques and assemble hardware mock-ups. Large scale vehicle specification development will be completed in first of the fiscal year. Contracts for detailed design and long lead time propulsion system components will be awarded. evaluation of alternative propeller manufacturing techniques. Development will continue on improved propeller concepts ıres for evaluation on the large scale vehicle and at full scale. Decrease in funding from FY 1982 to FY 1983 reflects ın of much of the initial study effort.

Y 1984 Planned Program: S0205 Submarine Atmosphere Control - Continue land-based testing of second system supporting concurrent operational evaluation. Complete operational evaluation and request Approval for se. Continue laboratory evaluation of 0.2% carbon dioxide scrubber prototype. Install solid polymer oxygen generator on hull and initiate operational evaluation. Complete operational evaluation of central atmosphere monitor and request for Service Use. Continue shipboard evaluation of intumescent and non-intumescent interior paints. Restart developments gency carbon monoxide and smoke control systems utilizing little or no electrical power. S0207 Advanced Submarine rogram - Complete intallation of split sternplane system in SSN 718, and begin evaluation. Use test vehicle to proof

test new alternate control concepts. Continue development of higher order integrated control system design tool. Begin preliminary design of new control system for possible shipboard installation. S0344 Submarine Auxiliaries - Continue life testing of prototype lead-acid and nickel-cadmium batteries. Complete operational evaluation of arcing fault detector. Resume developments of backup reverse osmosis desalinator, [redacted] water-lubricated air compressor, and fiber optic bearing performance monitor deferred in FY 1983. Complete design and fabrication of high pressure stage of [redacted] water-lubricated air compressor and 2000 gallon per day backup reverse osmosis desalinator. Complete development of on-line fiber optic bearing performance monitor and solicit proposals for fabrication of prototype unit. Initiate development of solid state depth detector. S0348 Deep Components - Continue laboratory experimental evaluation of all preliminary design candidates and select one design for full scale fabrication and certification evaluation. Complete piping system experimental stress factor and hull deflection analysis. Complete evaluation of piping system components. Initiate procurement of fouling protection system components for qualification testing. Initiate qualification evaluation of emergency deballasting high capacity blow valve. Continue testing on SSN 688 class ship and refine torpedo tube predictive deflection model. S0364 Submarine Damage Prevention - Continue development of fire suppression techniques and agents for submarines. Due to demonstrated vulnerability of hull insulation, find a replacement material. Develop specifications for a fixed system to be included in the FY 1985 design submarine. Develop new and/or improved portable extinguishing systems. Continue development of smoke removal, nitrogen suppression system and hydraulic fluid anti-misting agent. S0923 Improved Performance Machinery - Proceed into factory test of switchboards, motor generator, motor and pump p ototypes. Begin construction of advanced propulsion turbines/reduction gears. Determine optimum sound isolation system. Start integrated system test site construction. S0971 Submarine Shock - Continue to improve shock design and test criteria. Continue shock and underwater explosion tests of submarine equipments and structures in Submarine Shock Test Vehicles. Continue to develop design method for underwater explosion resistant submarine hulls. S1122 Titanium 100 - Storage and material characterization of Ti-100 plate material will continue. S1266-Submarine Propellers - Complete detailed design of Large Scale Vehicle. Continue design and acquisition of long lead time propulsion and control systems of Large Scale Vehicle. Continue development of improved propeller concepts and features for evaluation on the Large Scale Vehicle and at full scale.

5. (U) Program to Completion: S0205 Submarine Atmosphere Control - Complete Operational Evaluation of solid polymer electrolyte oxygen generator and 0.2% carbon dioxide scrubber in FY 1986, and emergency smoke and carbon monoxide removal systems in FY 1988. S0207 Advanced Submarine Control Program - Develop and proof-test alternate advanced control concepts. Fabricate and test advanced control systems. Develop comprehensive control design tool. S0344 Submarine Auxiliaries - Complete operational evaluation of reverse osmosis desalinator and lead-acid battery in FY 1986; fiber optic bearing performance monitor and depth detector in FY 1987; rotary high pressure air compressor in FY 1988; and nickel-iron or nickel-cadmium battery in FY 1989. Initiate new development starts for 400 hertz motor-generator over voltage protector and 7.5 kilowatt 400 hertz solid state inverter in FY 1985. S0348 Deep Components - Complete development and test and evaluation certification of piping systems by 1987, emergency deballasting and heat exchangers by FY 1989 and pumps and shaft seal by FY 1991, and the remaining systems by FY 1992. S0364 Submarine Damage Prevention - This is a continuing program. S0923 Improved Performance Machinery - This is a continuing program. Continue prototype component design, construction and factory test in parallel with integrated system test site construction. Integrate successful components at test site for conduct of system tests necessary to support approval for incorporation into

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submarine acquisition programs. FY 1985 reassessment of existing/advanced technology (the first since 1978) is expected to result in significant program redirection. S0971 Submarine Shock - Complete development of improved equipment design and test methods. Complete shock testing of all remaining unqualified items. Shock test submarine. Recertify submarine for unrestricted operations. Complete design method and specification for underwater explosion resistant submarine hulls. This also results in prediction capability for hull response and vulnerability to underwater explosions at deep submergence. S1122 Titanium-100 - Resume construction of large size modular sections. The joining of these modular sections will be initiated and completed. Complete evaluation of all models. Issue a draft fabrication document, update draft materials specification for plate and welding electrodes. Provide a fabrication cost analysis. S1266 Submarine Propellers - Refine propulsor design techniques including specification of key parameters and tolerances. Build large scale propulsors and conduct necessary evaluations by conducting experiments on the Large Scale Vehicle to verify and refine analytical performance prediction techniques for full scale performance.

6. (U) Milestones: Not applicable.

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(U) DETAILED BACKGROUND AND DESCRIPTION: The present Atmosphere Control System on nuclear submarines was put together by adapting individual existing commercial equipments and processes available in the 1950s. The net result has led to numerous deficiencies. A controlled atmosphere is essential to the mission of nuclear submarines. Maintaining an adequate atmosphere during long submergence involves processing of air to achieve temperature and humidity control, oxygen replenishment, removal of carbon dioxide, carbon monoxide and hydrogen, and atmosphere constituent sensing and monitoring. The Advanced Submarine Atmosphere Control System is designed to eliminate all known deficiencies, will be more reliable and maintainable and will meet the latest design performance requirements established by Operational Requirement SL-67R1. Savings in space, weight and power requirements will result from this development.

(U) RELATED ACTIVITIES: The Submarine Atmosphere Control Program receives technology support in the areas of [redacted] and oxygen generation from Program Element 62543N, Ships, Submarines and Boats Technology, Project SF-43-433, Auxiliary Machinery/Equipment.

(U) WORK PERFORMED BY: In-house: Naval Sea Systems Command, Washington, DC; Naval Research Laboratory, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Annapolis, MD; Naval Ship Engineering Station, Philadelphia, PA; Mare Island Naval Shipyard, San Francisco, CA; Naval Medical Submarine Research Laboratory, New London, CT; and Naval Surface Weapons Center, China Lake, CA. Contractors: Westinghouse Astronuclear, Pittsburgh, PA; Perkin-Elmer Corporation, Pomona, CA; General Electric, Wilmington, MA; Hamilton Standard, Windsor Locks, CT; General Dynamics, Electric Boat Division, Groton, CT; Bendix Corporation, Aerospace Division, Ann Arbor, MI; Operations Research, Inc., Silver Spring, MD; Desmatics, State College, PA; ENSCI, Inc., College Park, MD, and others to be selected.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program began in FY 1975. Completed cooperative and jointly sponsored Navy/National Aeronautics and Space Administration trade-off study identifying most promising life support development candidates for submarines. Completed development and ship evaluation of modifications necessary to modify on-board carbon dioxide scrubbers to meet near-term 0.5% carbon dioxide requirements. Completed comparative trade-off studies identifying most promising carbon dioxide removal processes capable of maintaining a 0.2% carbon dioxide concentration level (far-term requirement), and completed selected systems scale-up experiment using liquid monoethanolamine absorbent. Completed parametric experiment on molecular sieve carbon dioxide system. Selected monoethanolamine system for full prototype system development and solicited proposals for prototype design and fabrication. Awarded prototype system development contracts for design, fabrication and test and evaluation of an oxygen generator using a solid polymer electrolyte. A 20 module thermoelectric air conditioning system was designed, fabricated and installed in USS DOLPHIN (AGSS 555) for evaluation. Completed design, fabrication, and conducted over 20,000 hours of vendor testing on three full-scale 100 cell solid polymer electrolyte module oxygen generator assemblies and completed design and initial fabrication of the final full-scale prototype. Laboratory tests of a military specification prototype thermoelectric

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cooling module, shipboard installation on USS DOLPHIN, technical evaluation and operational evaluation was successfully completed. Completed laboratory demonstration and specification of a programmable scanning type mass spectrometer-based central atmosphere analyzer which will be programmed initially to monitor continuously 14 constituents and can be reprogrammed in the future to monitor additional constituents of interest as they arise. Awarded contracts for design and fabrication of two technically competitive analyzer prototypes. Completed design of each and fabrication of one military specification prototype analyzer. Completed laboratory evaluations of candidate carbons and modified procurement specifications to assure providing fleet with most effective gas absorption carbons available for use in removing trace contaminants. Continued a materials screening and evaluation program to prevent use of materials which may give off undesirable or toxic gases into a closed submarine atmosphere. Initiated development of paints permitting underway use in submarines and a general purpose paint for habitability spaces' metallic surfaces. Completed a trade-off study to identify candidate systems required Completed selected laboratory scale parametric experiments as well as design of a full-scale non-military specification preprototype system. Completed fabrication of full-scale preprototype, and completed over 3000 hours of testing of full scale preprototype non-military-specification system. Completed design of military specification prototype and ship alteration package required for installation of system on selected candidate hull for shipboard evaluation. Identified potential concepts for emergency carbon monoxide removal under low or no electrical power conditions, and emergency smoke removal.

2. (U) FY 1982 Program: Obtain Approval for Service Use for thermoelectric air conditioning system. Complete fabrication of full scale military specification prototypes and complete laboratory evaluations (performance, reliability, maintainability, shock, vibration, noise, etc.) of solid polymer electrolyte oxygen generator and central atmosphere analyzer. Complete fabrication and laboratory evaluation of two full scale military specification systems. Obtain approval of ship alteration package and integrated logistic support certification required for ship evaluation system and procure ship modification materials. Continue development of intumescent and non-intumescent (non-swelling) paints for underway use and initiate ship evaluation. Further efforts on emergency carbon monoxide and smoke removal have been deferred until FY 1984.

3. (U) FY 1983 Planned Program: Install initiate operational evaluation and continue laboratory testing of second full scale unit. Complete fabrication and design of 0.2% carbon dioxide scrubber. Install central atmosphere monitor on selected hull after obtaining integrated logistic support certification and initiate operational evaluation. Complete laboratory testing evaluation of solid polymer oxygen generator and obtain approval for ship alteration package required for ship evaluation. Continue development/verification of integrated logistic support packages for systems requiring ship operational evaluation. Continue ship evaluations of both intumescent and non-intumescent interior type paints.

Project: S0205 Title: Submarine Atmosphere Control System
Program Element: 63561N Title: Submarines (Advanced)
DOD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue land-based testing of second system supporting concurrent operational evaluation. Complete operational evaluation and request Approval for Service Use. Continue laboratory evaluation of 0.2% carbon dioxide scrubber prototype. Install solid polymer oxygen generator on selected hull and initiate operational evaluation. Complete operational evaluation of central atmosphere monitor and request Approval for Service Use. Continue shipboard evaluation of intumescent and non-intumescent interior paints. Restart developments for emergency carbon monoxide and smoke control systems utilizing little or no electrical power.

5. (U) Program to Completion: Complete operational evaluation of solid polymer electrolyte oxygen generator and 0.2% carbon dioxide scrubber in FY 1986, and emergency smoke and carbon monoxide removal systems in FY 1988.

6. (U) Milestones: Not Applicable.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0205	Submarine Atmosphere Control System	3,848	7,023	7,522	4,792	9,600	53,747

Project: S0348
Program Element: 63561N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Deep Components
Title: Submarines (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Beginning in the early 1960's, the Navy initiated development of a higher strength hull steel to permit designing combatant submarines for deeper depths. Increased submarine operating depth will increase the safe operating envelope for weapon evasion and casualty control, increase hull strength for improved resistance to weapon damage, decrease non-acoustic signature effects and provide a more favorable sonar environment. This project will examine all components and equipments subjected to submergence depth sea pressure, develop and test new components using different materials, if required, and will certify these components for use. Some of the components and equipments to be developed and certified are shaft seals, sea connected piping systems, deballasting systems, heat exchangers, high pressure head pumps, hull and backup valves, electrical hull fittings, torpedo tubes, and other hull integrity items.

(U) RELATED ACTIVITIES: Deep Components utilizes a HY-130 hull baseline; complements the work on HY-130 hull material being supported under Program Element 63531N, Project S0385, HY-130 Steel; provides technology in the areas of piping, heat exchangers and fouling protection to Program Element 63561N, Project S0923, Improved Performance Machinery; and reviews and utilizes technology from Program Element 63561N, Project S0971, Submarine Shock.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Annapolis and Bethesda, MD; Naval Research Laboratory, Washington, DC; Naval Sea Systems Command, Washington, DC. Contractors: General Dynamics, Electric Boat Division, Groton, CT; Operations Research Inc., Silver Spring, MD; and others to be selected.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program was a new start in FY 1978. Four specific Deep Components research and development efforts have been identified which are technically critical, possess long development times, and highest risk. These areas are shaft seals, sea connected piping systems, emergency main deballasting system, and heat exchangers. Efforts in these areas were as follows: shaft seal development stressed improved materials and seal configurations; sea connected piping system efforts concentrated on fabrication technology, fouling control and casting techniques for improved copper/nickel alloys and Inconel alloys; emergency main deballasting efforts centered about recovery characteristic studies performed to permit trade-off comparison of present type systems which may result in unacceptably large and heavy system designs versus systems requiring development of a . Also, a study to assess the possible use of chemical deballasting to assist both high pressure air system candidates was completed. The heat exchanger effort centered about the use of titanium materials development and improved fabrication techniques. Titanium tube heat exchangers offer benefits of reduced weight and volume and permit use of higher fluid flow velocities. Efforts include development of optimum balance between increased noise (as flow velocities increase), and decreased size; and development of an anti-fouling protection subsystem. Accomplishments include the following: Identification of improved seal fabrication materials coupled with evaluation of ten shaft seal design concepts. Selection of four concepts for preliminary design (balanced face seal, buffered seal, circumferential, and staged packing) and initiation of preliminary design of the staged packing and circumferential

Project: S0348 Title: Deep Components
Program Element: 63561N Title: Submarines (Advanced)
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concepts. Initiated design modifications for a deep depth seal qualification test machine. Initiated development of CA719 (chrome modified copper nickel) and Inconel 625 piping components; refined hull deflection analysis and developed stress indices evaluations for optimum piping structures; developed welding and fabrication procedures for CA719 AND IN625 components, initiated billet and forging optimization techniques for CA719 and IN625, developed military specification for component procurement and initiated procurement of IN625 test piping assemblies. Selected IN625 as the lead piping material and ceased work with CA719. Emergency main ballast tank parametric studies comparing recovery capabilities for systems were completed, and an increased volume, system with a higher capacity blow valve was chosen as prime certification candidate. Experimental verification of submarine rise rates for systems were completed and initiated design of higher capacity blow valve. Completed construction of piping component pier-side field test assemblies and initiated evaluation of two fouling protection systems (chlorine, copper/aluminum electrode) candidates for titanium tubing and Inconel systems. Initiated construction of a deep ocean fouling test facility. Developed titanium tube rolling and welding procedures for tubes and tubesheets, and developed bimetallic welding procedures. Completed test evaluation of TRIDENT thrust bearing and demonstrated start-up adequacy. Completed main seawater pump bearing design study, identified motor bearing size requirement and initiated procurement of motor bearings for testing. Completed torpedo tube deflection analysis model development. Developed trim and drain pump requirements.

2. (U) FY 1982 Program: Complete preliminary design of staged packing and circumferential shaft seal configuration alternatives, initiate preliminary design of buffered and balanced face seal concepts, procure materials for seal fabrication and evaluation and complete construction of seal qualification test machine. Continue piping system experimental stress factor and hull deflection analysis; fabricate and initiate piping component burst qualification tests. Continue fouling protection system pier side field test evaluation and initiate deep ocean fouling tests. Initiate fabrication of titanium heat exchanger and main seawater condenser preliminary design. Complete fabrication of emergency deballasting high capacity blow valve. Initiate laboratory testing of main seawater pump large size motor bearings and construct motor. Develop detailed test plan and procure torpedo tube deflection measurement instrumentation and initiate installation on submarine.

3. (U) FY 1983 Planned Program: Continue laboratory experimental evaluation of staged packing and circumferential shaft seal preliminary design candidates and complete preliminary design and initiate laboratory experimental evaluation of buffered and balanced face seal concepts. Continue evaluations of full-scale mockup of piping system components. Continue piping system experimental stress factor and hull deflection analysis. Complete fouling protection system pier side field test and deep ocean fouling test evaluations, and select design of fouling protection system components for certification evaluation. Continue main seawater condenser design and complete fabrication of titanium heat exchanger. Complete laboratory testing of main seawater pump large size motor bearings. Initiate testing on SSN 688 class ship to evaluate torpedo tube predictive deflection model. The reduction of $3,527 thousand from FY 1982 to FY 1983 was caused by a decision to concentrate the effort in improved Titanium condenser design while other efforts proceed at a slower pace since no new submarine class is under active design.

Project: S0348 Title: Deep Components
Program Element: 63561N Title: Submarines (Advanced)
DOD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue laboratory experimental evaluation of all preliminary design candidates and select one design for full scale fabrication and certification evaluation. Complete piping system experimental stress factor and hull deflection analysis. Complete evaluation of piping system components. Initiate procurement of fouling protection system components for qualification testing. Initiate qualification evaluation of emergency deballasting high capacity blow valve. Continue testing on SSN 688 class ship and refine torpedo tube predictive deflection model.

5. (U) Program to Completion: Complete development and certification test and evaluation of seawater piping systems by FY 1987, emergency deballasting and heat exchanger by FY 1989, pumps and shaft seals by 1991, and seawater valves, torpedo tubes, thrust bearing mounting, electrical penetrators, flexible couplings, carbon dioxide compressor, trash disposal unit and other items by 1992.

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0348	Deep Components	981	5,508	1,981	2,470	46,717	70,641

Project: S0923 Title: Improved Performance Machinery
Program Element: 63561N Title: Submarines (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The objectives of this project are to increase power density of future attack submarines by reducing the size and weight of the steam propulsion plant and associated auxiliary equipments while maintaining current standards of quieting, reliability, shock hardening, safety and maintainability. The approach is to investigate exploitation of existing technology for near-term payoff, low risk gains and investigate longer term technology developments which may permit significant long-term gains. Development area examples where improved machinery designs and performance characteristics may be achievable include reducing the size and weight of sound isolation systems for main turbines, gears and ship service turbine generators, high speed pumps, improved reduction gears and lighter weight, higher strength materials of construction. Other development areas include higher frequency and/or voltage electrical power systems, lubrication of turbines by working fluid, higher speed rotating machinery, advanced cooling methods for electrical components and advanced bearing technology. This program does not include nuclear reactor or associated primary plant components.

(U) RELATED ACTIVITIES: The Improved Performance Machinery program provides equipment and system design information to Program Element 62543N, Ships, Submarines and Boats Technology; Program Element 63564N, project S0408 Ship Concept Formulation and Program Element 63588N, project S0001 Ballistic Missile Submarine Subsystem Technology; reviews and utilizes material developed by Program Element 63561N, project S0348 (Deep Components); monitors developments for possible program inputs from Program Element 63561N, project S0344 (Submarine Auxiliaries) and includes the latest shock information and data developed under Program Element 63561N, project S0971 (Submarine Shock).

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Research Laboratory, Washington, DC; and Naval Ship System Engineering Station, Philadelphia, PA. Contractors: General Dynamics, Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Westinghouse Electric Corporation, Sunnyvale, CA and Pittsburgh, PA; General Electric Corporation, Lynn, MA; and Schenectady, NY; DeLaval Corporation, Trenton, NJ; Garrett Corporation, AiResearch Manufacturing Division, Torrance, CA; Curtiss-Wright Corporation, Woodbridge, NJ; Cutler-Hammer Corporation, Milwaukee, WI; Ward-Leonard Company, Mt. Vernon, NY; plus additional contractors not named here.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program began in FY 1978. Completed preliminary identification of potential system, component and technology development areas. Completed detailed assessment of industrial and technological capability to support weight and size reduction in propulsion, electrical power and engine room cooling water systems. Completed at-sea tests of existing main propulsion unit sound isolation systems. Completed specifications for and initiated proposal solicitations for advanced design turbines, reduction gears, condensers, heat exchangers, electrical generators, motors, switchboards, circuit breakers and associated supports and foundations. Completed component preliminary design contract awards. Selected Naval Ship System Engineering Station, Philadelphia, for integrated system test site and initiated site planning effort.

Project: S0923 Title: Improved Performance Machinery
Program Element: 63561N Title: Submarines (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue design/technology development under contracts awarded for components selected in FY 1979 and FY 1980. Complete preliminary design of advanced propulsion turbines/reduction gears, advanced condenser, heat exchanger and switchboards. Continue ship service turbogenerator prototype construction. Start switchboard construction. Contractors complete development of alternate sound isolation system designs. Continue integrated system test site planning, engineering effort and initiate site system and foundation design.

3. (U) FY 1983 Planned Program: Proceed into factory test of ship service turbogenerator prototype. Begin construction of advanced condenser, heat exchanger, motor generator, advance ship service turbogenerator, motor and pump prototypes. Continue design of advanced propulsion turbines/reduction gears. Begin model construction/test of optimum sound isolation system(s). Continue designs for necessary integrated system test site modifications and begin site preparation. Reduction in funding from FY 1982 to FY 1983 was caused by a reduction in contract services and a realignment of the program into the most promising areas with some discontinuations of alternative design solutions.

4. (U) FY 1984 Planned Program: Proceed into factory test of switchboards, motor generator, motor and pump prototypes. Begin construction of advanced propulsion turbines/reduction gears. Determine optimum sound isolation system. Continue integrated system test site construction.

5. (U) Program to Completion: This is a continuing program. Continue prototype component design, construction and factory test in parallel with integrated system test site construction. Integrate successful components at test site for conduct of system tests necessary to support approval for incorporation into submarine acquisition programs. FY 1985 reassessment of existing/advanced technology (the first since 1978) is expected to result in significant program redirection.

6. (U) Milestones: Not applicable.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
S0923	Improved Performance Machinery	19,302	22,991	21,893	30,696	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	91,943	98,415	7,032	17,033	Continuing	Continuing
S0210	Submarine Acoustic and Torpedo Countermeasures (Quantities; Sub-Tasks)	903	705	2,411	2,421	Continuing	Continuing (*)
S0221	Target Strength Reduction (Quantities; Sub-Tasks)	7,169	5,788	1,536	11,549	Continuing	Continuing (*)
S0311	MK 48 Advanced Capabilities (Advanced) (Quantity - Advanced Development Models)	83,871	91,922	(20,483)**	(0)**	0**	(266,795)** (16)****
S1686	Attack Submarine Combat Control Systems Improvement Program (Advanced) (Sub-Tasks)	0***	0***	3,085	3,063	Continuing	Continuing (*)

* Sub-Tasks and Test Item Quantities for project S0210, S0221 and S1686 are too numerous to tabulate.
** Project S0311 MK 48 Advanced Capabilities transfers to Program Element 63691N in FY 1983.
*** Funded in FY 1982 and prior years as the Low Ship Impact Ranging sub-task of the Wide Aperture Array (Advanced) program (project S0222 of Program Element 63504N).
****Advanced Development Models for DT&E/IOT&E procured prior to FY 1981.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program provides for the advanced development of submarine tactical warfare systems which include submarine launched torpedoes, acoustic and torpedo countermeasure systems, the reduction of own-submarine target strength, and attack submarine combat system improvements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0210, Submarine Acoustic and Torpedo Countermeasures: Continue development of advanced acoustic warfare system capabilities, acoustic countermeasure devices and launchers. Increase in funding from FY 1982 to FY 1983 is due to developmental start-up of new acoustic warfare capabilities as well as hardware procurement/fabrication and testing. S0221, Target Strength Reduction: A [redacted] material concept will be developed. Extend USS BATFISH [redacted] assessment and assess tactical implications [redacted] Decrease in funding from FY 1982 to FY 1983 is due to reduction of effort in FY 1983. S0311, MK 48 Advanced Capabilities (Advanced): Transitioned to Program Element 63691N. S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced): Low Ship Impact Ranging algorithms for [redacted]

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[ ] will undergo design test II. Conduct development/operational test of [ ] algorithm. Continue validation of [ ] algorithm. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work of development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: (1) FY 1983 funding for project S0311 (MK 48 Advanced Capabilities (Advanced)) has been transferred to Program Element 63691N (MK 48 Advanced Capability (Advanced)). (2) Project S1686 has been added as an FY 1983 new start which continues the Low Ship Impact Ranging sub-task, funded in FY 1982 and prior years in project S0222 of Program Element 63504N. The FY 1983 estimate for the project is 3,324 below that shown in the FY 1982 Descriptive Summary (Low Ship Impact Ranging Sub-Task) due to program restructuring. (3) FY 1981 program element total funding has increased by 15,162 due to revised inflation factors in projects S0210 and S0221 (-7 and -66 respectively) and additional funding for acceleration of the MK 48 Advanced Capability (Advanced) program, project S0311 (+15,235 supplemental requested for the corresponding engineering development program (Program Element 64562N, project S0366) and later transferred to this program element). (4) The FY 1982 program element total estimate has increased by 48,048 due to revision of estimates in projects S0210 and S0221 (-59 and -231, respectively) and additional funding requested and approved in the FY 1982 amendment for acceleration of the MK 48 Advanced Capabilities Torpedo program (+48,338). (5) The FY 1983 program element total estimate has decreased by 4,079 due to reduction of planned activity in project S0210 (-935), delay of several efforts in project S0221 including the [ ] target strength reduction material test patch installation to FY 1984 (-4,809) and transfer of FY 1983 funding for the MK 48 Advanced Capabilities (Advanced) program to Program Element 63691N, as described in (1) above (-1,420 in project S0311) and the start of project S1686 as described in (2) above (+3,085). (6) The FY 1983 estimate and total estimated cost of the MK 48 Advanced Capabilities (Advanced) program (project S0311) have been shown for convenience. (7) The number of advanced development torpedo modifications procured for project S0311 has been reduced from 24 to 16 as a cost control measure.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	63,094	76,781	50,367	11,111	Continuing	Continuing
S0210	Submarine Acoustic and Torpedo Countermeasures	1,585	910	764	3,346	Continuing	Continuing
S0221	Target Strength Reduction	8,892	7,235	6,019	6,345	Continuing	Continuing
S0311	Torpedo Advanced Development	52,617	68,636	43,584	1,420	0	184,159
	(Quantity - Advanced Development Models)						(24)

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0210, Submarine Acoustic and Torpedo Countermeasures - Threat analysis indicates that platform and weapon acoustic sensors will be much more sophisticated with the capability to discriminate against present countermeasure devices. This program will define requirements and develop devices with the capability and flexibility to meet anticipated threats. Advanced development investigations will be conducted to provide submarines with an acoustic warfare capability (detection, localization, classification, command and control, countermeasure devices and launchers) so as to survive the threat. New developments will include improved acoustic warfare sensors and processors, command and control functions, system integration, new countermeasure devices and countermeasure device launcher. S0221, Target Strength Reduction - A target's strength is measured by the magnitude of the echo which it returns to an active sonar system installed in either an anti-submarine warfare ship or a homing weapon. A reduction in the target strength of a submarine target would reduce the ability of a weapon or ship active sonar system to detect that submarine. The Target Strength Reduction Program was initiated in 1973 with the goal of reducing active sonar target strength of U.S. submarines to counter improvements in threat sonar. This project will develop the technology, engineering and materials required to reduce the target strength of U. S. Navy ships, thereby reducing the threat posed by ASW ships with active sonar systems and weapon systems employing active homing techniques. This project will provide data to U. S. ASW weapons improvement programs. The long range objectives are to provide an operationally reliable system that is effective over a range of operational areas. S0311, MK 48 Advanced Capabilities (Advanced) - Recent and predicted advances in Soviet submarine design will reduce the effectiveness of the MK-48 Torpedo.
range and possibly redu

This project will include improvements to the MK-48 guidance and control, warhead exploder, and propulsion and fuel tank subsystems to provide greatly enhanced acquisition, pursuit and homing performances against future threats. Procurement of twenty-four advanced development models was initiated in FY 1980 for Development Test and Evaluation and Initial Operational Test and Evaluation. The quantity was subsequently reduced to sixteen. S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced): Program provides more accurate rapid ranging to support delivery of the MK 48 torpedo and tactical missiles against a maneuvering target. Present fire control systems require to generate a solution against an assumed non-maneuevering target. Responds to Operational Requirement AS-55 by development of software changes to host sonar or fire control systems which utilize existing acoustic arrays in SSN 594 and later class attack submarines. FY 1982 and prior effort funded as a sub-task in Program Element 63504N, project S0222 (Wide Aperture Array (Advanced)). Techniques of current interest include

(U) RELATED ACTIVITIES: Project S0210, Submarine Acoustic and Torpedo Countermeasures: The Submarine Sonar Improvement program (Program Element 64503N, project S0219) integrates acoustic intercept receivers developed in this project into the AN/BQQ-5 series sonars. Expendable countermeasures devices completing advanced development in this program are transitioned to engineering development in Program Element 64562N, project S0235, Submarine Acoustic Warfare Systems. To avoid duplication of effort, the

Element: 63562N
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Is coordinated with Program Element 11221N, project S1265, Ballistic Missile Submarine Unique Countermeasures Development. S0221, Target Strength Reduction: Program Element 62543N, Project SF43-452, Acoustical Silencing, addresses technology ent at the exploratory level. Project S0311 of this Program Element (MK 48 Advanced Capability) and Program Element Project S0199, Advanced Lightweight Torpedo, use the results of Target Strength Reduction technology in support of weapon system development. Project S0311, MK 48 Advanced Capabilities (Advanced): A concurrent full-scale engineering ent program commenced in FY 1981 under Program Element 64562N, project S0366, MK 48 Advanced Capabilities (Engineering). get Strength Reduction program (Project S0221 of this Program Element) provides supporting data in the area of target e active sonar detection. Project S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced): the Low Ship Impact Ranging sub-task (funded in Program Element 63504N, project S0222 (Wide Aperture Array (Advanced)) in and prior years). Ranging techniques completing advanced development in this program will be incorporated in the AN/BQQ-5 sonars by the Submarine Sonar Improvement program (project S0219 of Program Element 64503N) or in the MK 117 Fire Control y the Attack Submarine Combat Control System Improvement Program (Engineering) (project S0236 of Program Element 64562N), priate.

K PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Research Laboratory, Underwater Sound e Division, Orlando, FL; Defense Advanced Research Projects Agency, Arlington, VA; David W. Taylor Naval Ship Research and ent Center, Bethesda, MD (Lead Laboratory, Target Strength Reduction program); Naval Underwater Systems Centers, Newport, Laboratory, MK 48 Advanced Capabilities Torpedo) and New London, CT; Naval Coastal Systems Center, Panama City, FL; Naval Center, China Lake, CA; Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Undersea Warfare Engineering Keyport, WA; Naval Ocean Systems Center, San Diego, CA and four others. Contractors: Firestone, Akron, OH; Aerojet ystems Company, Azusa, CA; Vought Corp., Advanced Technology Center, Dallas, TX; General Dynamics Corp., Electric Boat , Groton, CT; Applied Research Laboratories, University of Texas, Austin, TX and Pennsylvania State University, State PA; Rockwell International, Rocketdyne Division, Canoga Park, CA; Hughes Aircraft Corp., Fullerton, CA (Prime Contractor, vanced Capabilities Torpedo); Gould, Inc., Cleveland, OH; Westinghouse Electric Corp., Annapolis, MD and five others.

GRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

FY 1981 and Prior Accomplishments: S0210, Submarine Acoustic and Torpedo Countermeasures - Completed Advanced Torpedo nd[ ]Advanced Development and transferred both to engineering development. Completed advanced ent of Submarine external countermeasure launching system and transferred it to engineering development. Completed development effort for Tonal Masker and Mobile Submarine Simulator[ ]coverage improvement. Completed initial ity investigations for multi-function countermeasure device. Commenced initial feasibility investigations for acoustic system display improvements. Conducted countermeasure and performance parameters analysis and system integration efforts. arget Strength Reduction - Completed the design of [ ]systems for[ ]submarines and the

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The [redacted] was installed in FY 1976 and evaluated. Supporting analytic and model studies were conducted to support the [redacted] installation, as well as to provide engineering inputs to weapon and sonar designers. The first full scale prototype of a [redacted] target strength reduction system for an Attack Submarine was installed [redacted] in FY 1977/1978 and evaluated at sea in September 1978. Completed the [redacted] Target Strength Reduction system installation and evaluation [redacted] Results showed [redacted] Conducted quarter scale model testing. S0311, MK 48 Advanced Capabilities (Advanced) - Computer simulation studies to define optimum torpedo acoustic system parameters were completed. Fabricated hardware for in water data collection and [redacted] Conducted design studies on evaluation targets. Completed Milestone I with Department of the Navy Systems Acquisition Review Council approval to proceed to validation phase (advanced development). Completed evaluation of the proposals and selected a validation phase contractor. Awarded prime contract for the Validation Phase. Began development of automatic test equipment concepts. Completed in-water testing of conceptual baseline guidance and control and warhead/exploder subsystems. Began design of torpedo hardware and software. Awarded a contract to upgrade propulsion and fuel subsystems for increased speed and depth. Began power and size reduction studies for S0366 MK 48 Advanced Capabilities (Engineering). Began preparation of specification for full scale engineering development model torpedo and automatic test equipment. S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced): Program was funded as the Low Ship Impact Ranging sub-task of the Wide Aperture Array (Advanced) program (project S0222 of Program Element 63504N). Refer to the corresponding Descriptive Summary.

2. (U) FY 1982 Program: S0210, Submarine Acoustic and Torpedo Countermeasures - Complete feasibility investigation of multi-function countermeasure. Conduct feasibility investigation for acoustic warfare system display improvements. Continue countermeasure simulation and performance parameter analysis and system integration efforts. S0221, Target Strength Reduction - The final [redacted] material concept will be accepted. The system design requirements [redacted] will continue to be evaluated. S0311, MK 48 Advanced Capabilities (Advanced) - Commence delivery and in-water tests of Advanced Capability advanced development model torpedoes and propulsion upgrade subsystems. Continue upgrade of real time simulator. Continue concept development of the automatic test equipment for torpedo testing. Continue power and size reduction studies for S0366, MK 48 Advanced Capabilities (Engineering). Complete specifications for the engineering development model torpedo and start work on engineering development torpedo. Continue engineering development in Program Element 64562N, project S0366, MK 48 Advanced Capabilities (Engineering). All necessary experimental work will have been done and the system will be ready for full-scale development. S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced): Program is funded as the Low Ship Impact Ranging Sub-Task of the Wide Aperture Array (Advanced) program (Project S0222 of Program Element 63504N). See corresponding Descriptive Summary.

3. (U) FY 1983 Planned Program: S0210-AS, Submarine Acoustic and Torpedo Countermeasures - Continue advanced development of multi-function countermeasure, acoustic warfare system integration and threat/requirements updates. Commence advanced development of acoustic warfare system [redacted] system, advanced acoustic warfare system [redacted]

Program Element: 63562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Advanced)
Budget Activity: 4 - Tactical Programs

Transfer acoustic warfare system display improvements to the Submarine Acoustic Warfare Systems program (project S0235 of Program Element 64562N) for engineering development. Conduct feasibility investigations of and advanced acoustic warfare system. Conduct requirements definition and transducer procurement for the system. Procure, install and test for acoustic warfare system S0221, Target Strength Reduction - Extend assessment. Assess tactical implications S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced): Algorithms will undergo design test II. Conduct development/operational test of algorithm. Continue validation of algorithm. The increase in project S0221 (Target Strength Reduction) is due to reduction of effort. The increase in project S0210 (Submarine Acoustic and Torpedo Countermeasures) is due to the start of new developments as well as hardware procurement, fabrication and test activity. Decrease in Program Element total funding from FY 1982 to FY 1983 is due primarily to transfer of project S0311 (MK 48 Advanced Capabilites (Advanced)) to Program Element 63691N.

4. (U) FY 1984 Planned Program: S0210-, Submarine Acoustic and Torpedo Countermeasures - Complete advanced development model fabrication and commence testing of multi-function countermeasure. Commence preparation of advanced development model specification. Conduct test and evaluation of system transducers. Procure, install and test multimode hydrophone for the acoustic warfare system Complete advanced acoustic warfare system design evaluation and commence preparation of advanced development model specification. Continue countermeasures simulation, vulnerability, effectiveness, threat update and system integration efforts. S0221, Target Strength Reduction - Install material test patches, conduct quarter scale model tests, develop model and evaluate at sea. Award contracts for material pilot production runs and system design engineering. Commence efforts on low target strength designs Increase in funding will allow award of contracts per above and increased program scope supporting new submarine design. S1686, Attack Submarine Combat Control Systems Improvement Program (Advanced) - Continue validation of algorithms. Submit engineering change proposal

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

6. (U) Milestones: See the Program Element Descriptive Summary for Program Element 63691N (MK 48 Advanced Capability (Advanced)).

Project: S0221
Program Element: 63562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Target Strength Reduction
Title: Submarine Tactical Warfare Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: A target's strength is measured by the magnitude of the echo which it returns to an active sonar system installed in either an anti-submarine warfare ship or a homing weapon. A reduction in the target strength of a submarine target would reduce the ability of an active sonar system to detect that submarine by reducing the strength of the returning echo and would decrease the active sonar homing weapon's ability to acquire the target. Reducing a submarine's target strength would permit it a wider latitude of operation in the vicinity of or against ASW forces and would greatly decrease the chance of successful ASW weapon attack in a hot war situation. The Target Strength Reduction Program was initiated in 1973 with the goal of reducing active sonar target strength of U.S. submarines to counter improvements in threat sonar[ ] This project will develop the technology, engineering and materials required to reduce the target strength of U.S. Navy ships, thereby reducing the threat posed by ASW ships with active sonar systems and weapon systems employing active homing techniques. The project developments will be coordinated with other projects to ensure that the problems presented by operational and projected threat sonar systems are addressed and evaluated; and the project will provide data to U.S. ASW weapons improvement programs [ ]. The long range objectives are to provide an operationally reliable[ ] target strength reduction system that is effective over a range of operational areas. The technology developed will be integrated into design models that will enable future ships, sonar and weapon designers to take into account the effects of target strength reduction on their respective systems' performance.

(U) RELATED ACTIVITIES: Program Element 62543N, Ship, Submarines and Boats Technology, Project SF43-452, Acoustical Silencing, addresses technology development at the exploratory level. Program Element 63691N, project S0311, MK 48 Advanced Capability (Advanced) and Program Element 63610N, project S0199, Advanced Lightweight Torpedo, use the results of the Target Strength Reduction technology in support of weapon sensor system development.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD (Lead Laboratory); Naval Underwater Systems Center, New London, CT; Naval Coastal Systems Center, Panama City, FL; Puget Sound Naval Shipyard, Bremerton, WA; Norfolk Naval Shipyard, Portsmouth, VA; Naval Weapons Center, China Lake, CA; Naval Surface Weapons Center, White Oak, Silver Spring, MD; Mare Island Naval Shipyard, Vallejo, CA. Contractors: General Dynamics, Electric Boat Division, Groton, CT; Tracor, Inc., Austin, TX; Applied Research Laboratory, University of Texas, Austin, TX; Applied Research Laboratory, Pennsylvania State University, State College, PA; Burke Industries, San Jose, CA; Bolt, Beranek and Newman, Cambridge, MA; Rockwell International, Groton, CT; Battelle Columbus Laboratories, Columbus, OH.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Prototype[ ] systems to provide up to[ ] and search sonar frequencies[ ] have been installed on[ ] The system installed[ ] also provided [ ] The[ ] was installed during FY's 1977

Project: S0221 Title: Target Strength Reduction
Program Element: 63562N Title: Submarine Tactical Warfare Systems (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

and 1978 and was evaluated in September 1978. Reports summarizing the test and evaluation have been issued. Backfit of the into the fleet as a ship alteration was not recommended since residual highlights from areas not covered negated reductions. The during FY's 1979 and 1980 and an at-sea evaluation was performed in October 1980. A baseline trial was conducted. Initial results indicated a. To gain a more thorough understanding of the target strength an extensive experiment using the quarter scale model KAMLOOPS and a 1/4 scale replica was conducted during FY 1981. Analysis of this data will allow further interpretation and verification was developed and used. Standardization trials were also conducted to determine the impact. Efforts were started in FY 1981 reduce trial time. Development efforts for the design of a have been in progress since FY 1980.

2. (U) FY 1982 Program: Data analysis and reporting will be completed trials and the special experiment on KAMLOOPS. The target strength of will be measured provide data to guide the design. Efforts to improve will continue. Preparations for a system ship alteration will continue with emphasis on finalizing material specifications, installation procedures and installation cost-reduction. Development of improved materials will continue towards a goal of selecting a final material for a prototype system. The effort will progress from a material development phase into production and installation engineering phases. A contract will be initiated for the detailed design. The prototype systems on will be monitored to determine the survivability/maintenance requirements in service use.

3. (U) FY 1983 Planned Program: Effort will be expended on material development and design of a prototype system. Long term evaluations will continue. Contracts will be initiated for material pilot production runs and system design engineering so that these tasks can be started early in FY 1984. Extend. Assess tactical implications.

4. (U) FY 1984 Planned Program: A patch test of the material will be installed on a nuclear submarine to demonstrate seaworthiness of materials and procedures. System engineering and installation procedures will be completed. A contract will be awarded for material production. The "brass-board" model will be procured and evaluated at sea. Effort will start on advanced concepts including system, low target strength designs for. Quarter scale model tests using the DOLLY VARDEN model will be conducted.

Project: S0221 Title: Target Strength Reduction
Program Element: 63562N Title: Submarine Tactical Warfare Systems (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0221	Target Strength Reduction	7,169	5,788	1,536	11,549	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63564N
Title: Ship Concept Formulation
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	28,632	9,994	18,810	26,857	Continuing	Continuing
S0408	Ship Concept Formulation	14,339	9,994	18,810	26,857	Continuing	Continuing
S1508	New Class Carrier Design	14,293	0	0	0	0	14,293

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develops the data and tools required by government naval architects and marine engineers for the design of ships in the Navy's Shipbuilding Program. Each ship in the Shipbuilding Program must be justified on the basis of mission need.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Surface Ship Continuing Concept Formulation task area will develop 20-25 design alternatives for 10-12 separate mission areas. For four ship types in the Extended Planning Annex, requirements will be identified and alternatives developed which will disclose capabilities shortfalls requiring R&D solutions prior to total ship development. Work will continue to exploit computer based technology and develop design tools, practices, and techniques to improve, reduce the cost, and do government developed ship designs better and faster. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary result from:

(U) Project S0408 Ship Conform FY 1981 funds decreased by $332 due to routine budget adjustments. FY 1982 funds reduced by $7,549 as the result of a Navy budget reduction, acceleration of LHDX Preliminary Design into FY 1981 and a directed reduction for the use of contractor support services. FY 1983 funds reduced by $10,464 due to adjustments made during the Navy budget development process.

(U) Project S1357 FFX FY 1982 funding of 4,041 was deleted by Congressional action.

(U) Project S1508 New Class Carrier Design results from restoration of a FY 1981 Congressional increase of $4293.

Program Element: 63564N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Concept Formulation
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	22,169	24,671	21,584	29,274	Continuing	Continuing
S0408	Advanced Ship Development	12,169	14,671	17,543	29,274	Continuing	Continuing
S1244	Light Carrier Design	10,000	0	0	0	0	10,000
S1357	FFX	0	0	4,041	0	0	4,041
S1508	New Class Carrier Design	0	10,000	0	0	0	10,000

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 63564N
Title: Ship Concept Formulation
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The purpose of this program is the development of data and tools needed by government naval architects and marine engineers to design ships in the Navy's Shipbuilding Program. Surface Ship Continuing Concept Formulation develops whole ship concepts to meet future requirements and identifies technology needs for their development. Its major emphasis is the identification of feasible ship designs through the integration of mission requirements and technology developments early in the whole ship planning and acquisition process. Although the program is not designed to establish either mission requirements or technology developments, its primary effort is concentrated on the interface between the two, and the whole Ship Concept Synthesis. Results are used to identify candidate ships to meet the requirements of the Extended Planning Annex period and to recommend the R&D programs and priorities which are needed to support the plans. Computer Supported Design exploits computer based technology to benefit all government developed ship designs. It will provide programs enabling Ship Design Managers to quickly develop the best ship to meet stated operational requirements. It includes identification of designers' needs and the development, testing, validation, and implementation of their computer based product. Advanced Concepts Studies are executed for ships in the Extended Planning Annex to identify requirements and develop alternatives early enough that equipment and system research and development can be influenced as an integral part of total ship development. Under Analytic Techniques ship design tools, practices, and techniques are developed to enable the government to more rapidly develop better ship designs. Prior to FY 1983, this program element supported the feasibility and Preliminary Design phases for ships in the Navy's Shipbuilding Program.

(U) RELATED ACTIVITIES: Ships, Subs, and Boats Technology (Program Element 62543N); Submarines (Advanced) (Program Element 63561N); Ship Subsystem Development/Land Based Test Site (Program Element 64567N); Attack Submarine Development (Program Element 63569N), DDGX (Program Element 63589N).

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, White Oak, Silver Spring, MD; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; and others. Contractors: J.J. Henry Co., Inc., New York, NY; John J. McMullen Assoc. Inc., New York, NY; M. Rosenblatt & Son, Inc., New York, NY; Wheeler Industries, Washington, DC; and others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed basic procedures and issued Naval Sea Systems Command guides for conducting ship design phases. Conducted conceptual efforts on the following ship types within the past five years which enabled the Navy to carry out ship acquisitions subsequently approved by Congress: Ocean Surveillance Ship, Cable Repair Ship, Fleet Oiler, Salvage Ship, and AEGIS Guided Missile Cruiser. Developed analytical techniques to provide improved procedures and rapid turnaround for trade-off studies. Performed preliminary design phases of: Landing Craft Air Cushion and Mine Countermeasures Ship . Commenced advanced concepts studies for 1990's Minesweeper (MX), Destroyer (DD-X), and Advanced Aircraft Carrier. Commenced conceptual work on Guided Missile Destroyer (DDGX).

Program Element: 63564N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Concept Formulation
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Complete Amphibious Assault Ship (LHDX) and Coastal Mine Hunter (MSH) preliminary designs. Commence Amphibious Transport Dock (LPDX) feasibility phase. Ship designs to be studied under Surface Ship continuing Concept Formulation include Battle Group Escort, Light Battle Group Escort, Rapid Deployment Force Surface Effect Ship Tug/Barge, and Underway Replenishment Ship. Mission/Requirements studies to be executed include Dispersed Strike, Landing Vehicle Tank carrier, and Salvage/Rescue Ship. Computer Support Design projects to be carried out include Amphibious Assault Ship and Auxiliary Ship Synthesis Models, Hull Design System Integration, ship vulnerability model, Combat System Compartment design, hull form systems, and ship iterative magnetic field analysis. Advanced concepts studies will begin for two ship types in the Extended Planning Annex. Under Analytic Techniques, a SWATH data base, a Relisbility, Maintainability, and Availability model of a submarine, a small ship design model, and graphics applications will be developed. Emerging ship requirements will be investigated.

3. (U) FY 1983 Planned Program: The Surface Ship Continuing Concept Formulation task area will develop 20-25 design alternatives for 10-12 separate mission areas including Major Battle Group components, Amphibious Force, Rapid Deployment Force, Mobile Logistics Support Force, and Mine Countermeasures. Computer Support Design projects to be carried out include Ship Synthesis Model Interface, Hull, Structure, and Arrangements Programs and Models, Shipboard Electrical System Simulator, and Automated Test Development for Ship Design. Advanced Concepts Studies will commence for four ship types in the Extended Planning Annex. Work will continue on the development of design tools, practices, and techniques for general ship design application and emerging ship requirements.

4. (U) FY 1984 Planned Program: Continue as indicated in paragraphs 2 and 3. Funds are higher in FY 1984 than in FY 1983 due to an anticipated requirement to execute the design of new ships now in the Extended Planning Annex.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63566N
Title: Amphibious Assault Craft
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	14,362	9,240	10,437	8,139	Continuing	Continuing
S0241	Amphibious Assault Craft	14,362	9,240	10,437	8,139	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Amphibious Assault Landing Craft Program is an advanced development effort. The program objective is to define, develop, demonstrate and document a system of advanced landing craft which will improve the mission effectiveness of the ship-to-shore movement of men, vehicles, equipment and material during amphibious assault. Current program emphasis is focused on Navy system trials of the JEFF Craft in direct support of the Landing Craft Air Cushion detailed design effort. In addition, these trials are directed towards the conduct of technology development tasks and the demonstration of the operational utility of advanced craft for amphibious warfare and related alternate missions. Results of this program will provide essential air cushion vehicle technology data in such areas as skirts, fans, engine inlet air filtration, craft control and overall system performance to support Landing Craft Air Cushion design. Concurrent efforts and subsequent program emphasis will focus on preplanned product improvements to support the acquisition of follow-on Landing Craft Air Cushion Vehicles; and identification of requirements for the development of future amphibious craft (JOE/JIM) to satisfy functional requirements within the amphibious assault echelon not completely in the domain of Landing Craft Air Cushion.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Amphibious Assault Landing Craft Development Program will continue to focus its efforts on providing Landing Craft, Air Cushion Follow-on Acquisition Program product improvement engineering, test and trials support. Planning will continue to sequentially explore other missions and applications for air cushion vehicles. Analysis will continue to identify future amphibious mission support craft to be developed. The Amphibious Assault Landing Craft Development effort supporting follow-on Landing Craft Air Cushion acquisition will provide technology and engineering data for composite fan blades, propellers, and shroud development; and for integrated control system, mixed flow fan, and propeller erosion development and tests. The JEFF craft located at the Naval Coastal Systems Center, Panama City, Florida will continue Navy systems trials in direct support of the Landing Craft Air Cushion Follow-on Acquisition Program. Operations with the JEFF craft will demonstrate low risk hardware improvements, support integrated logistics support planning and concurrently provide for air cushion vehicle operator training of initial Landing Craft Air Cushion crews. As this is a continuing program, the above funding profile includes escalation and encompasses all work or development phases currently planned or anticipated through FY 1984 only.

Program Element: 63566N
Title: Amphibious Assault Craft
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 descriptive summary and that shown in this descriptive summary (-2,219 in FY 1981) reflect delayed testing activity initially budgeted in FY 1981, but now planned for FY 1982. Planned FY 1982 test and trials are to provide test bed use of the JEFF craft in direct support of the Acquisition Program and technology support of a low risk design. As landing craft air cushion hardware subsystems are finalized, the JEFF craft will be utilized to validate these subsystems and contribute to the data base in support of Landing Craft Air Cushion approval for service use. Outyear funding requirements to provide continued support for the development of advanced amphibious assault craft (JOE/JIM) are under review. FY 1982 increase of $1,743 reflects shift of testing from FY 1981 and refinement of cost estimates. FY 1983 decrease of $274 results from refinement in cost estimates and budgetary adjustments.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	16,384	16,581	7,497	10,711	20,370	214,437
S0241	Amphibious Assault Craft	16,384	16,581	7,497	10,711	20,370	214,437

The above funding profile included escalation and encompassed all work or development phases previously planned or anticipated through FY 1986 only. Total Estimated Cost above reflected total through FY 1986.

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
SCN Funds	42,000	98,400	65,400	144,800	TBD	TBD
Quantity	*	(3)	(3)	(6)		

* Long lead procurement.

Program Element: 63566N
Title: Amphibious Assault Craft
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Amphibious Assault Landing Craft Program is established to define, demonstrate and document a system of advanced landing craft which will improve the mission-effectiveness of the ship-to-shore movement of men, vehicles, equipment and material during amphibious assault. Particular emphasis is placed upon the capability to launch amphibious operations from ships located at a considerable distance from the beachhead. Landing craft, with 35 to 50 knot capability, are required to replace the existing landing craft of World War II vintage. The existing landing craft, capable of 8 to 12 knots and constrained to off-load at the water's edge on a small number of hydrographically suitable beaches, limit the flexibility of the task force in the amphibious objective area. After examination of both conventional, planing hull, and unconventional craft, the program has concentrated on the design and construction of two differently configured air cushion vehicles. These fully amphibious, high speed Air Cushion Vehicle craft will provide the needed combination of speed, range, payload capability and over-the-beach capability to allow a wider choice of landing sites and inland offloading areas well beyond the surf zone and initial beach obstacles. Considering the need for stand off launching of amphibious assault forces, and for complementing helicopter vertical lift inland, these craft were shown to be cost effective when compared to the current mix of landing craft. While developed as landing craft, they can be readily modified to serve in other amphibious warfare roles such as mine laying/sweeping, defense against high speed small boat attack, reconnaissance, medical evacuation and initial assault element force insertion. Funding from 1971 has been directed toward prototype construction to specific Navy/Marine operational requirements including: the ability to carry a 60-ton payload, a speed of 50 knots in Sea State Two against a 25 knot headwind, and a range of at least 200 nautical miles. The craft are 90 feet long and 48 feet wide and have a full length well deck, 27 feet wide, with a drive-through capability. Subsequent phases of this program will define the characteristics and develop the technology for the complete family of other future advanced landing craft (JOE, 120-160 ton capacity and JIM, 15-30 ton capacity).

(U) RELATED ACTIVITIES: Ship Propulsion Systems (Advanced), PE 63508N; Ships, Subs and Boats Technology, PE 62543N; Logistics Technology, PE 62760N. This program supports the Landing Craft Air Cushion under Ship Development (Engineering) PE 64567N through the development and testing of Air Cushion Vehicle technology.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Coastal Systems Center, Panama City, FL; Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA; Norfolk Naval Shipyard, Portsmouth, VA; Naval Air Propulsion Center, Trenton, NJ; Naval Air Test Center, Patuxent, MD. Contractors: Aerojet Liquid Rocket Company, Sacramento, CA and Panama City, FL; Bell Aerospace Company, New Orleans, LA; Draper Laboratory, Cambridge, MA; Gibbs and Cox, New York, NY; SRI International, Menlo Park, CA; Todd Shipyard, Seattle, WA; TRW Corporation, McLean, VA; and Georgia Institute of Technology, Atlanta, GA.

Program Element: 63566N
Title: Amphibious Assault Craft
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: Navy and Marine Corps analysis identified the need to improve the projection of United States forces ashore in a hostile environment. Operational analyses and simulation studies were conducted as guides to selected possible development: a 60-ton payload, 50-knot air cushion vehicle (JEFF Craft); a 15-ton payload, 50-knot air cushion vehicle or 35-knot planing craft (JIM); and a 160-ton payload, 35-knot planing craft (JOE). The 60-ton payload, 50-knot air cushion vehicle, the JEFF Craft, was selected for initial development. Design and procurement of two JEFF Craft were initiated in March 1971 with the Aerojet-General Corporation, for the JEFF(A), and the Bell Aerospace Company, for the JEFF(B). Further analysis of the remaining craft (JOE/JIM) will determine selection of the next craft to be developed, however, analyses of designs and model tests of other craft have been accomplished by various subcontractors. JEFF Craft model tests were conducted and a computer simulation of craft motions and performance was developed. Construction of two JEFF Craft air cushion vehicles was accomplished. Roll-out of the JEFF(A) was accomplished in December 1976; of the JEFF(B) in March 1977. Both craft were moved to the Naval Coastal Systems Center, Panama City, FL. Crew training for both operations and craft maintenance was conducted for initial crews and replacement crews. Navy Systems Trials and operational demonstrations have been conducted. Operations with the craft are being conducted to collect technical data and characterize the craft's operating envelope. The results of such underway operations are being analyzed, evaluated, and provided to the follow-on Landing Craft/Air Cushion Acquisition Program. Initial interface tests with Marine Corps equipment have been conducted. Design and development of the shipboard craft handling system, designated Amphibious Inhaul Device, have been completed. Components of the Amphibious Inhaul Device System were subjected to land-based tests which proved performance capability. Detailed design of the craft/ship modifications were developed for a selected Landing Ship Dock (LSD-32). The Amphibious Inhaul Device System was installed on the USS SPIEGEL GROVE (LSD-32) and tested with conventional craft. Initial ship interface tests were conducted with USS SPIEGEL GROVE and the JEFF Craft. The craft are being operated and maintained by a Navy Experimental Trials Unit located at Naval Coastal Systems Center, Panama City, FL. The Experimental Trials Unit is staffed for the required manning levels. The Test and Evaluation Master Plan has been approved. In addition to operations with LSD-32, Operational Tests included JEFF craft interfaces with the M198 howitzer, three lanes of vehicles (M54 trucks with M114 howitzers), the M60A1 tank, and the Light Amphibious Container Handler. Navy Systems Trials of the JEFF Craft were conducted in direct support of the Landing Craft, Air Cushion detailed design effort.

2. (U) FY 1982 Program: Navy System Trials are continuing to establish a craft operating envelope in support of Landing Craft, Air Cushion design requirements. Beach and amphibious shipping interface tests will be completed in support of Landing Craft Air Cushion requirements definition. Replacement crews will be trained and contributions made to the development of the training program for initial operating personnel. Navy System Trials of JEFF will continue in support of the acquisition program and subsystem testing. Sorties will be conducted in support of tactics development for amphibious craft operations, and to investigate alternative missions for advanced landing craft. Requirements analyses and craft characteristics studies will be initiated for the JOE and JIM landing craft. Technology development programs will be identified for these craft.

Element: 63566N Title: Amphibious Assault Craft
sion Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

) FY 1983 Planned Program: Navy System Trials will continue to support follow-on acquisition program and subsystem . Amphibious Assault Landing Craft craft missions will be conducted to support tactics development for amphibious ons and to investigate alternative mission potential for air cushion vehicles. Support will be provided for pre-planned improvement for Landing Craft Air Cushion Lead Production. Candidate concepts for JOE/JIM craft will be evaluated and d.

) FY 1984 Planned Program: Navy System Trials of the JEFF Craft will continue in support of Landing Craft Air Cushion ion in the area of Subsystems testing and Air Cushion Vehicle training. Candidate JIM and JOE craft configuration, eristics, and technology development programs will be refined and selected.

) Program to Completion: The Program will continue through FY 1987 to provide support for the development of advance ous assault craft (JOE, JEFF and JIM). Navy System Trials of the JEFF Craft will continue in support of the Landing Craft hion lead and follow-on production in the areas of subsystem testing and in providing initial Air Cushion Vehicle training iliarization for the first Landing Craft Air Cushion crews. Required JOE and JIM craft characteristics will be defined and ogy development conducted in support of a program decision in FY 1984. Selected concepts will be constructed and tested as d development craft in FY 1985 through FY 1989.

Milestones:

Milestones		Date
1. Complete JEFF Operational Testing		May 1984
2. Program Decision JOE/JIM Craft		July 1984
3. Complete JEFF initial Landing Craft Air Cushion training		December 1984
4. Complete all JEFF Craft testing	(September 1986)*	April 1986

hown in FY 1982 Program Element Descriptive Summary.

Program Element: 63566N
DOD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Amphibious Assault Craft
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) The JEFF Craft are full scale advanced development craft necessary to assess fully the feasibility and the problems of applying air cushion vehicle technology to amphibious landing craft configurations capable of meeting the requirements of the 1980's, within the dimensional constraints imposed by well decks of the Dock Landing Ship (LSD) and the Amphibious Transport Dock (LPD). The principal areas of technical risk are craft control techniques, air cushion seal concepts, powering and structural concepts and certain material developments. Test results will provide design criteria and resolve major technical problems to permit feasibility and cost/performance trade-offs leading to low risk acquisition of the follow-on production configuration, the Landing Craft Air Cushion.

b. (U) Construction of these craft was completed in FY 1977. Contractor checkout tests and shakedown trials were completed in June, 1979, to insure that the craft and their subsystems functioned satisfactorily and conformed to design specifications. Navy Systems Trials are being conducted to evaluate craft technical characteristics, establish the operating envelope, evaluate critical interfaces with Marine Corps personnel and equipment and Navy amphibious shipping, evaluate craft performance in hostile operating environments and evaluate the ability of Navy personnel to operate and maintain the craft. Craft accomplishments to date include 743 operating hours attained, operation at speeds up to 75 knots, operation in sea state 4, and operation at 370,000 pounds maximum weight. Test results are being utilized during the system and subsystem design phases of the Landing Craft Air Cushion acquisition program. Operator training and reliability and maintainability data collection are included in this test and trials program. Testing of the JEFF Craft in other amphibious roles is also planned.

c. (U) The JEFF Craft developed in this program will not be delivered to the Fleet. Tests and trials of these craft are providing decision data which are being used to define the follow-on production craft configuration. It is expected that these decisions will be validated by Operational Test and Evaluation of the follow-on production craft.

2. (U) Operational Test and Evaluation

a. (U) Operational Test and Evaluation Accomplished to Date:

(1) (U) OT-0 (December 1964-August 1965) validated the Air Cushion Vehicle concept for certain naval missions in amphibious, unconventional, special and mine warfare, and Search and Rescue operations. Test items were the initial Navy air cushion vehicle test craft, SKMR-1, and the commercial air cushion vehicles, SRN-5, and VA-3. Testing was conducted by the Commander, Operational Test and Evaluation Force in the Norfolk operating area utilizing Navy personnel. Results of OT-0 testing were used to exploit the Air Cushion Vehicle concept in amphibious warfare; maintainability and reliability test results were not an issue.

(2) (U) OT-IA (November 1978) involved assessing the potential operational effectiveness and operational suitability of the Amphibious Inhaul Device as an amphibious craft handling device. The Amphibious Inhaul Device system is representative of equipments to be procured, if needed, for Fleet Amphibious ships. Based upon its demonstrated capability to control both conventional landing craft and the JEFF craft aboard the USS SPIEGEL GROVE (LSD-32), Commander, Operational Test and Evaluation Force recommended that full scale development of the Amphibious Inhaul Device system be commenced.

(3) (U) OT-IB testing is structured to provide confidence in the Air Cushion Vehicle concept for amphibious warfare operations and to support a decision for the follow-on lead production Landing Craft Air Cushion. OT-IB consists of a series of tests covering all applicable phases of an amphibious operation. In all phases of OT-IB Commander, Operational Test and Evaluation Force participates in and supports all testing and Navy crews operate and maintain the craft. Commander, Operational Test and Evaluation Force submits an independent assessment of the projected operational effectiveness and operational suitability of an air cushion vehicle in amphibious operations upon completion of each phase. Testing to date in the vicinity of Panama City, FL., (Naval Coastal Systems Center Experimental Trials Unit) in August 1979, April 1980, July 1980, September 1980, November-December 1980, and June 1981 has demonstrated the air cushion vehicle's potential to be operationally effective: (1) based on its capability to operate from the well deck of an LPD and LSD, up to and including sea state, three; (2) conduct ship-to-shore movement of assault equipment; (3) operate over typical beach terrain and discharge at a prepared site; (4) support the Logistics Over the Shore program; and (5) respond to positive control and information from surface ships, aircraft, and shore installations. Testing has included well deck exits and entries with the USS SPIEGEL GROVE (LSD-32) in sea states 0-3 and at underway ship speed to 16 knots. Temperature, noise and cargo handling tests were conducted in the well deck of the USS AUSTIN (LPD-4). Beach salvage towing tests were accomplished at the Engineering Services Center, Tyndall Air Force Base. Craft overwater operations have been conducted at over-hump speed in sea states 0-3. Operational testing has also included beach interface and cargo transfer/handling capabilities ashore. Commander, Operational Test and Evaluation Force has recommended that certain design features be incorporated in the follow-on Landing Craft Air Cushion design. These recommendations have been addressed in the Landing Craft Air Cushion Top Level Requirements and Statement of Work for guidance to System Design and Specification Phase Contractors.

b. (U) Additional Planned Operational Test and Evaluation

1. (U) OT-IB will address the ability of air cushion vehicles to interface with LPD-4 Class amphibious ships.

2. (U) OT-IC will be structured to demonstrate the potential of air cushion vehicles in Naval operational tasks other than amphibious warfare. Testing will involve special warfare, coastal patrol interdiction and search and rescue.

Program Element: 63566N
DOD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Amphibious Assault Craft
Budget Activity: 4 - Tactical Programs

3. (U) System Characterisics

Characteristics of the JEFF Craft:

	OBJECTIVES		DEMONSTRATED (DT-1)	
	JEFF (A)	JEFF (B)	JEFF (A)	JEFF (B)
Length	96 feet	86 feet, 9 inches	N/A	N/A
Beam	48 feet	47 feet	N/A	N/A
Climb	11.5% grade	13% grade	9%	13%
Payload	60 tons	60 tons	40 tons	60 tons
Speed	50 knots (Sea State 2)	50 knots (Sea State 2)	58 knots (Sea State 2)	75 knots (Sea State 2)
Range	200 nautical mi.	200 nautical mi.	140 nautical mi.	210 nautical mi.
Negotiate	8 feet plunging surf, sand, swamp, ice and grasslands	8 feet plunging surf, sand, swamp, ice and grasslands	4'-5' surf 12' dunes	4'-5' surf 12' dunes

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63568N
DoD Mission Area: 238 - Other Naval Warfare
Title: Combat System Architecture (CSA)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,968	3,962	2,786	3,129	Continuing	Continuing
S1231	Combat System Architecture (CSA)	2,968	3,962	2,786	3,129	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Combat System Architecture is a program which will result in the definition of upgraded/improved surface ship combat systems and provide the technical/programmatic direction to guide combat system designs for new construction, modernization and overhauls. This effort considers relative mission priorities for surface ships and the threats which may confront these ships during their operational lifetimes. This Program will provide the standards and performance requirements necessary to allocate combat system functions, establish subsystem interface requirements and structure the battle organizations of emerging combat systems. Additionally, Combat System Architecture is focused at resolving long standing combat system and subsystem management and interoperability problems by developing and implementing standards to be used in generating designs for both combat system element development efforts and combat system engineering for specific combat system designs. This Program is not responsible for the direct management of specific equipment development efforts or specific ship class combat system design/engineering but will recommend requirements for specific new and upgraded combat systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Refine, upgrade and maintain current the Surface Ship Combat System Master Plan; this Plan will continue to provide architecture guidance to all ship class managers and subsystem acquisition managers to support time phased subsystem and combat system planning, programming, design, procurement and testing. Complete architectural and technical performance descriptions of the combat systems for CV/CVN and selected CG classes to guide/support planned Navy Tactical Data System upgrade. Initiate development of architectural and digital integration guidance to support DD 993 and BB 61 overhauls. Conduct middle life combat system upgrade assessment for DD 963. Develop combat system test criteria to support CG testing at Integrated Combat System Test Facility. Conduct architectural assessment to support long range targeting. Review/revise the Combat System Architecture/Engineering Guidance and Standards to allocate combat systems function for selected ship/classes to ensure that appropriate design, programming, and testing results. As this is a continuing program, the above funding includes outyear escalation and encompasses all work now planned or anticipated through FY 1984 only.

Program Element: 63568N
DoD Mission Area: 238 - Other Naval Warfare

Title: Combat System Architecture (CSA)
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Decrease of $32 in FY 1981, a decrease of $463 in FY 1982 and a decrease $1,639 in FY 1983 result from refinement of cost estimates including inflation and adjustments during budget development.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,601	3,000	4,425	4,428	Continuing	Continuing
S1231	Combat System Architecture (CSA)	8,601	3,000	4,425	4,428	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: 63568N
DoD Mission Area: 238 - Other Naval Warfare

Title: Combat System Architecture (CSA)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The complexity of modern shipboard weaponry necessitates that total combat system design be accomplished using a top down approach and that systems engineering involve the entire combat suite, including the effective integration of functionally oriented warfare area subsystems. A combat system proposed for the arming of a surface combatant has tasks dictated by the mission of the ship and the expected threat that may be encountered in the accomplishment of that mission. Combat system design criteria, based on the assessment of mission and threat, necessarily include performance requirements that are achieved only by the total system (reaction time, firepower, survivability, availability, etc.). Achievement of these requirements is dependent not only on the performance of the individual systems but also the manner in which the functionally oriented warfare area subsystems are utilized. Additionally, although current design methods are effective in fielding subsystems of immense capability, they have been severely criticized for requiring excessive time and effort from system development initiation to incorporation into the Fleet. A more structured, or architectural approach to combat system design engineering addresses the apparent shortcomings in our current procedures. Combat System Architecture was developed by a combined Secretary of the Navy, Chief of Naval Operations, Chief of Naval Material, and Commander, Naval Sea Systems Command review of ongoing development programs concerned with combat system design. It is planned to apply Combat System Architecture to future surface combatant designs and to impact existing ships and systems on a continuing and evolutionary basis. This Program provides a focal point in translating the combat system operational requirements into technical characteristics which can be addressed by subsystem developers and will provide the guidance and standards to objectively compare competing technical concepts.

(U) RELATED ACTIVITIES: Ships System Engineering Standards, PE 63532N; Advanced Command Data Systems, PE 63519N, Shipboard Data Multiplex System, PE 63509N; Surface Ship Continuing Concept Formulation, PE 63564N; and Combat Systems Engineering, PE 63582N.

(U) WORK PERFORMED BY: Naval Surface Weapons Center, White Oak, MD and Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA; Applied Physics Laboratory/Johns Hopkins Univ., Silver Spring, MD; industry and other Navy activities. Roles of other participants and activities will continue to be defined at appropriate times in the continuing evolution of this program.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: FY 1980 funds were used to apply Combat System Architecture to DDGX and to document lessons learned, to continue architectural development and to adapt analysis tools for Combat System Analysis and Combat Interfaces with a Battle Group. Initiated efforts to establish standards/guidance for data bussing/distributed processing concepts, common interface specifications for cross ship class applications and combat system functional allocation. In FY 1981, developed a preliminary Combat System Master Plan which provides architectural and programmatic guidance for combat system upgrades for surface ships. Initiated development of Combat System Architecture/Engineering Guidance and Standards. Initiated development of a consistent combat system engineering process and identification of a hierarchy of documentation required to plan

Program Element: 63568N
DoD Mission Area: 238 - Other Naval Warfare

Title: Combat System Architecture (CSA)
Budget Activity: 4 - Tactical Programs

and engineer combat systems. Completed preliminary draft of standards for Combat Direction System/Combat Weapon Control System/TOMAHAWK interfacing for CG 47, DD 963 and DDGX classes. Initiated assessments of DD 963 and CGN 38 class combat systems to relate architectural guidance to technical performance to be achieved during near term overhauls.

2. (U) FY 1982 Program: Promulgate the Combat System Master Plan. Develop standard characterizations of threats and battle situations to ensure a traceable and consistent basis for all combat system level architectural and technical efforts. Complete the architectural and technical performance descriptions for the combat systems in DD 963 and CGN 38 which support near term overhauls; these descriptions will guide and support testing at Integrated Combat System Test Facility. Complete development of the combat system engineering process and define the detail required to plan and execute combat designs. Initiate the architectural and technical efforts required to support Navy Tactical Data System upgrades in CV/CVN and CG classes. Compare currently planned combat system upgrades and selected subsystems with the Architectural Standards to ensure that they provide required combat functions and can be integrated into the combat system to provide required performance. Initiate architectural and technical assessments of DD 963 to result in mid-life area Anti-Air Warfare improvements for the class. Complete preliminary Integration Requirement to guide the digital integration/interface of Combat Weapon Control System with Combat Direction System.

3. (U) FY 1983 Planned Program: Review/update the Combat System Master Plan to reflect evolving threat, emerging technology and current combat system, shipbuilding and overhaul schedules for all surface ships. Complete the architectural and technical performance descriptions of CV/CVN and selected CG classes; this will be the design guidance to support Navy Tactical Data System Block 1 planning and subsequent class testing. Provide area Anti-Air Warfare alternative combat systems for DD 963 to support mid-life planning and resultant design. Review with industry the Architectural Standards to ensure subsystem and equipment productability against the Standards. Initiate architectural system engineering assessments to guide combat system upgrades in DDG 993, BB 61 and other classes to be determined. . Initiate assessment of combat system R&D programs against fleet deficiencies/threat to establish whether major fleet requirements are being satisfied. Develop Integration Requirement Documents for WLR-8/SLQ-17 to Combat Direction System and Architectural Standards Weapon Control System to Combat Direction System to provide technical guidance for the development of tactical software. Initiate an architectural assessment to define on-ship combat system correlation techniques of organic and non-organic sensors to provide support for tactical warning and long range targeting.

Program Element: 63568N
Title: Combat System Architecture (CSA)
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Upgrade the Master Plan to support technical and programmatic planning/execution by Combat System Engineers and acquisition managers. Continue the development of alternative combat system architectural baselines for upgrade of selected ships/classes.

5. (U) Program to Completion: Combat System Architecture will be a continuing program to ensure appropriate and non-redundant development of combat systems and subsystems, as well as the assessment of combat system alternatives for new and existing ships/ship classes.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63569N
Title: Attack Submarine Development
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	28,908	4,968	10,959	20,974	Continuing	Continuing
S1255	Advanced Submarine Technology	13,107	268	1,978	6,790	Continuing	Continuing
S1256	Submarine Cost Reduction	4,850	2,200	3,505	1,180	Continuing	Continuing
S1257	Follow-On Attack Submarine	0	0	0	0	0	7,131
S1570	SSN 688 Class Development	10,951	2,500	5,476	13,004	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Attack Submarine Development program provides for the development of SSN 688 Class improvements, the conduct of design efforts in systems integration and arrangements for candidate new design attack submarines for the future, and the development of design modifications and construction methods to reduce submarine acquisition costs. The project composition of the program has been formulated to support major decisions regarding the maintenance of attack submarine force levels and individual submarine capabilities while effectively dealing with adverse trends in submarine acquisition costs.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S1255 (Advanced Submarine Technology): Conduct studies to improve and integrate submarine systems and concepts for both refinements to the SSN 688 class design and candidate new design attack submarines for the future. Conduct feasibility studies of attack submarine candidates as assigned by the Chief of Naval Operations. S1256 (Submarine Cost Reduction): Continue technical analysis and implementation of high pay-off cost reduction proposals into the designs of current and future submarines. S1570 (SSN 688 Class Development): Continue design and effectiveness studies of candidate SSN 688 Class improvements. Complete advanced development of improvements selected for the FY 1985 and later ships of the class. Increase in funding from FY 1982 to FY 1983 is due to increased efforts resulting from prior deferral of efforts originally planned for FY 1982. As this is a continuing program, except for project S1257, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 (amended) Descriptive Summary and that shown in this Descriptive Summary are as follows: The FY 1981 Program Element Total Estimate has increased by 1,313 reflecting offsetting adjustments in projects S1255 and S1256 (+7 and -7 respectively), and

Program Element: 63569N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Attack Submarine Development
Budget Activity: 4 - Tactical Programs

an increase in scope (+1,313) of project S1570. The FY 1982 Program Element Total Estimate has decreased by 14,500 due primarily to restructuring of the Program Element (-5,632, -3,437 and -5,371 in projects S1255, S1256 and S1570, respectively) as further described in this Descriptive Summary, and also to correction of an error in the (amended) FY 1982 Descriptive Summary (-60 in project S1255). Estimates for the FY 1983 program year and for the total cost of project S1257 are shown in this year's Descriptive Summary.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,000	27,595	19,468	TBD	Continuing	Continuing
S1255	Advanced Submarine Technology	1,000	13,100	5,900*	TBD	Continuing	Continuing
S1256	Submarine Cost Reduction	1,000	4,857	5,637	TBD	Continuing	Continuing
S1257	Follow-On Attack Submarine	3,000	0	0	TBD	TBD	TBD
S1570	*SSN 688 Class Development*	0	9,638	7,871	TBD	Continuing	Continuing

* The FY 1982 estimate shown for project S1255 was in error and should have read 5,960 vice 5,900.

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 63569N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Attack Submarine Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Numerous attack submarine force-level studies, beginning in the mid-1970s, have identified a requirement for increased attack submarine construction rates to sustain adequate numbers of attack submarines in the fleet. In addition, the Navy recognizes the need to stop the upward spiral in submarine acquisition costs in order to keep procurement of these additional submarines at affordable levels. The Attack Submarine Development program is structured to provide Department of Defense managers with the information required to support major decisions required for sustaining an adequate and affordable attack submarine force. S1255 (Advanced Submarine Technology): This project will provide design efforts in system integration and arrangements for both refinements to the SSN 688 Class design and candidate new design attack submarines for the future. S1256 (Submarine Cost Reduction): The objective of the cost reduction program is to reduce the acquisition cost of future attack submarines and ballistic missile submarines by reviewing costs associated with ship procurement requirements and modifying ship system, subsystem, component, fabrication, material, testing and other types of specifications, procedures and construction requirements to reflect cost reduction initiatives that are acceptable to the Navy, without unacceptable penalty to required standards of performance or safety. Although cost reduction is implicit in all submarine-related research and development programs, a formal submarine construction cost reduction effort focuses Navy technical and design efforts toward reduction of actual ship fabrication costs. The approach to achieve this objective includes solicitation of all shipbuilding/construction talent to provide cost reduction suggestions, a systematic review of requirements, a functional assessment of operational needs and a review of construction (shipbuilder) procedures and testing requirements to identify the high cost areas warranting technical analysis. S1570 (SSN 688 Class Development): The Navy plans to continue procurement of the SSN 688 class and has placed a high priority on increasing the capability of the class. This project provides for the ship design and effectiveness studies necessary to evaluate and develop potential class improvement concepts for the SSN 688 Class.

(U) RELATED ACTIVITIES: Program Element 63564N (Ship Concept Formulation), Project S0408 (Ship Concept Formulation) provided attack submarine conceptual and preliminary design efforts prior to FY 1980. Program Element 63588N (Strategic Submarine Subsystem Technology Program), Project S0001, identifies and develops cost-effective subsystem concepts for future strategic submarines. Program Element 64567N (Ship Subsystem Development), Project S0857 (Ship Subsystem Development) provides for the incorporation of SSN 688 Class improvements into the Contract Design (plans and specifications) of the SSN 688 Class.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Mare Island Naval Shipyard, Vallejo, CA; Naval Underwater Systems Center, Newport, RI. Contractors: General Dynamics, Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA; Advanced Marine Enterprises, Arlington, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The program element was restructured to reflect Chief of Naval Operations direction to (1) discontinue design efforts of Follow-On Attack Submarine candidates and to continue procurement of the SSN 688 Class, (2) to place highest program priority on increasing the capability of the SSN 688 Class, and (3) to advance submarine technology to

support both refinements to the SSN 688 Class and generation of an attack submarine of new design in the future. S1255 (Future Attack Submarine): Commenced the program in FY 1980 by defining candidate system concepts and improvements appropriate to a future attack submarine design. Began studies to examine their effect on ship design and effectiveness. In FY 1981, terminated design studies (initiated prior to FY 1980 in project S1257) of two future Attack Submarine candidates. The project was restructured pursuant to Chief of Naval Operations guidance and its name changed to Attack Submarine Technology. Continued design studies to determine the potential benefits of selected concepts for potential inclusion in future attack submarine classes. S1256 (Submarine Cost Reduction): Continued technical analysis of existing and new cost reduction suggestions. Implemented approved suggestions into current submarine design specifications. Began to focus program on four high pay-off technology areas. S1257 (Follow-On Attack Submarine): Conducted conceptual studies of follow-on attack submarine candidates. No conspicuously cost-effective candidate emerged from these studies. As a result, this project was terminated and project S1255 restructured as indicated above. S1570 (SSN 688 Class Development): This program is a FY 1981 start, initiated in response to the above-mentioned Chief of Naval Operations guidance. Defined candidate system concepts and improvements appropriate to ships of the SSN 688 class. Conducted studies to examine their effect on ship design and effectiveness.

2. (U) FY 1982 Program: S1255 (Advanced Submarine Technology): Conduct studies to improve and integrate submarine systems and concepts for both refinements to the SSN 688 class design and candidate new design attack submarines for the future. S1256 (Submarine Cost Reduction): Continue technical analysis and implementation of high pay-off cost reduction proposals. S1570 (SSN 688 Class Development): Continue studies of candidate SSN 688 Class improvements. Complete advanced development of improvements selected for the FY 1984 and later ships of the class.

3. (U) FY 1983 Planned Program: S1255 (Advanced Submarine Technology): Continue studies to improve and integrate submarine systems and concepts for application to the SSN 688 class design and future Attack Submarine designs. Conduct feasibility studies of Attack Submarine candidates as assigned by the Chief of Naval Operations. S1256 (Submarine Cost Reduction): Continue technical analysis and implementation of high pay-off cost reduction proposals. S1570 (SSN 688 Class Development): Continue design and effectiveness studies of candidate SSN 688 Class improvements. Complete advanced development of improvements selected for the FY 1985 and later ships of the class. Increase in funding from FY 1982 to FY 1983 is due to prior deferral of efforts originally planned for FY 1982.

4. (U) FY 1984 Planned Program: S1255 (Advanced Submarine Technology): Continue studies to improve and integrate submarine systems and concepts for application to the SSN 686 class design and future Attack Submarine designs. Conduct feasibility studies of Attack Submarine candidates as assigned by the Chief of Naval Operations. S1256 (Submarine Cost Reduction): Continue technical analysis and implementation of high pay-off cost reduction proposals. S1570 (SSN 688 Class Development): Continue design and effectiveness studies of candidate SSN 688 Class improvements. Complete advanced development of improvements selected for the FY 1986 and later ships of the class.

Program Element: 63569N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Attack Submarine Development
Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

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DEPARTMENT OF THE NAVY SUPPORTING DATA FOR FISCAL YEAR 1983 BUD--ETC(U)
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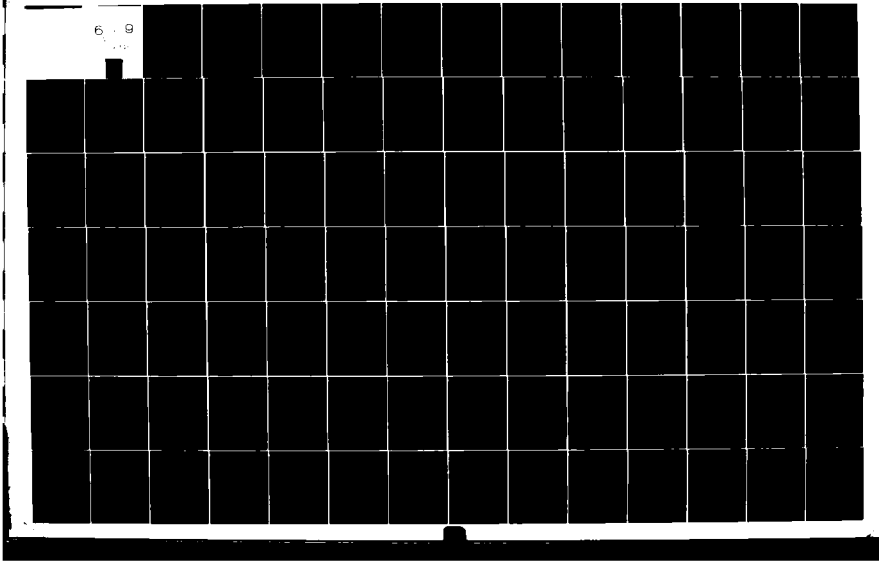

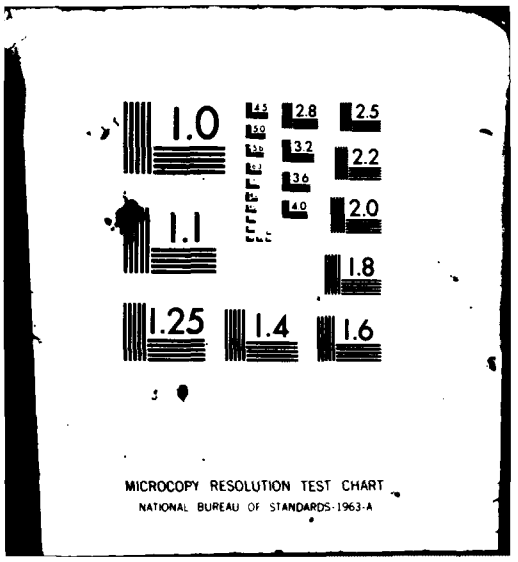
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Project: S1570
Program Element: 63569N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: SSN 688 Class Development
Title: Attack Submarine Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The SSN 688 Class entered the shipbuilding program in FY 1970. As the products of research and development become available, ship design and effectiveness studies are conducted to determine the impact of incorporating these improvements into the class. By this process, major improvements were incorporated in the FY 1973 (Mark 117 Fire Control System), FY 1977 (Sea Launched Cruise Missile), and FY 1978 (Vertical Launch System) ships of the SSN 688 class. The Navy plans to continue procurement of the SSN 688 Class and has placed high priority on increasing the capability of the class. The SSN 688 Class Development Program provides for the ship design and effectiveness studies necessary to evaluate and develop potential class improvement concepts.

(U) RELATED ACTIVITIES: Program Element 63564N - Ship Concept Formulation, Project S0408 - Ship Concept Formulation, provided design efforts prior to FY 1980. Program Element 63569N - Attack Submarine Development, Project S1256 - Submarine Cost Reduction, is developing concepts to reduce the acquisition cost of submarines without degrading performance or safety. Program Element 64567N - Ship Subsystem Development, Project S0857 - Ship Subsystem Development, provides for the incorporation of SSN 688 Class improvements into the Contract Design (plans and specifications) of the SSN 688 Class.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI; Naval Ocean Systems Center, San Diego, CA. Contractors: General Dynamics/Electric Boat Division, Groton, CT; Newport News Shipbuilding, Newport News, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: New start in FY 1981. Evaluated the products of ongoing research and development programs to determine candidate system concepts and improvements appropriate to ships of the SSN 688 Class. Conducted ship design studies to determine the effect of incorporating selected improvements on ship design and effectiveness, including retractable bow planes (for drag reduction and increased speed), additional torpedo tubes (for increased firepower), over-the-horizon targeting capability, sonar system improvements, and an improved propeller (for noise reduction).

2. (U) FY 1982 Program: Continue design and effectiveness studies of candidate SSN 688 Class improvements. New candidate improvements include longer life shaft seal, communications systems improvements and an advanced sonar dome. Complete advanced development of improvements selected for the FY 1984 and later ships of the class.

3. (U) FY 1983 Planned Program: Continue the evaluation of research and development to identify candidate SSN 688 Class improvements. Conduct studies to determine impact on ship design and effectiveness. Complete advanced development of improvements selected for the FY 1985 and later ships of the class. Increase in funding from FY 1982 to FY 1983 is due to increase in planned activity.

Project: S1570 Title: SSN 688 Class Development
Program Element: 63569N Title: Attack Submarine Development
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue the evaluation of research and development to identify candidate SSN 688 Class improvements. Conduct studies to determine impact on ship design and effectiveness. Complete advanced development of improvements selected for the FY 1986 and later ships of the class.

5. (U) Program to Completion: Continue research and development evaluation to identify candidate class improvements. Determine the impact on ship design and effectiveness of incorporating selected improvements. Complete advanced development of improvements selected for later ships of the class. Terminate SSN 688 Class Development effort when a new attack submarine enters the shipbuilding program and begin to evaluate class improvements to later ships of the new class.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
S1570	SSN 688 Class Development	10,951	2,500	5,476	13,004	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63570N
DoD Mission Area: 238 - Other Naval Warfare

Title: Advanced Nuclear Reactor Components and Systems Development
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,226	9,090	11,536	15,166	Continuing	Continuing
S1258	Advanced Nuclear Reactor Components and Systems Development	5,226	9,090	11,536	15,166	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element is directed toward the design, development and testing of new and improved reactor components and systems for use in naval nuclear propulsion plants. A growing share of naval nuclear propulsion research and development effort is directed toward work common to several types of reactor plant components and systems. Work under this program element will involve efforts in the pump, valve, instrumentation and control, and heat transfer equipment areas to ensure the continued safe and reliable long term operation of naval nuclear propulsion plants.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue efforts to develop and test more reliable and capable steam generators, pumps, valves, and advanced design instrumentation and control equipment. These efforts include designing components and testing, analyzing and evaluating materials and component operation. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: the decrements in the FY 1982 and FY 1983 funding estimates ($11 and $406, respectively) are the result of a revised estimate of program needs in FY 1983 and downward adjusted inflation factors for both fiscal years.

Program Element: 63570N
DoD Mission Area: 238 - Other Naval Warfare

Title: Advanced Nuclear Reactor Components and Systems Development
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	5,226	9,101	11,942	Continuing	Continuing
S1258	Advanced Nuclear Reactor Components and Systems Development	0	5,226	9,101	11,942	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63570N
DoD Mission Area: 238 - Other Naval Warfare

Title: Advanced Nuclear Reactor Components and Systems Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element was a new start in FY 1981. The establishment of this new program was necessary because, as the number of nuclear ships increases, a growing portion of naval nuclear propulsion research and development effort will be directed toward development work common to several types of reactor plant systems and components. The funding for this program has been accomplished by realigning other research and development funds already contained within the Five Year Defense Plan and represents no overall increase in funding for this effort. This element supports a program for the design, development and testing of new and improved reactor components and systems for use in all types of naval nuclear propulsion plants. Work under this new program element will initially involve efforts in the pump, valve, advanced design instrumentation and control, and heat transfer equipment areas. It is expected that, in the future, other areas requiring additional research and development efforts will be identified and pursued within this element.

(U) RELATED ACTIVITIES. Work conducted under this element is closely coordinated with other naval nuclear propulsion research and development projects and research and development work on nuclear reactor plants conducted by the Department of Energy, Office of the Deputy Assistant Secretary for Naval Reactors.

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

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Development efforts in the instrumentation and control area are directed toward applying state of the art technology to naval nuclear propulsion instrumentation for use in new and existing ships. This equipment is required to meet the more demanding requirements of the new advanced, long life cores and to ensure that instrumentation and control equipment can continue to be supported as older designs become obsolete. Advanced reactor instrumentation and control equipment developments included:

Program Element: 63570N
DoD Mission Area: 238 - Other Naval Warfare

Title: Advanced Nuclear Reactor Components and Systems Development
Budget Activity: 4 - Tactical Programs

A continuous program of evaluation and testing is necessary to increase valve reliability and maintainability. Experience gained from the long term operation of valves in nuclear ships and prototypes is constantly evaluated and incorporated into valve design, evaluation and testing efforts.

2. (U) FY 1982 Program: Continue development efforts in the instrumentation and control area in order to apply state-of-the-art technology to naval nuclear propulsion instrumentation for use in new and existing ships and to ensure continued long term support for this equipment. Continue work on equipment. Initiate design of an advanced system. Continue efforts. This work includes Continue efforts to improve the performance of

Perform engineering studies and tests for improvement program. Program Element 62542N, Nuclear Propulsion Technology, and includes developing analytical techniques and hardware that can be used. Continue design, analysis, and testing in support of naval reactor plant valves. Planned efforts include development of

3. (U) FY 1983 Planned Program: Continue development efforts to upgrade instrumentation and control equipment for nuclear reactor plants and to provide continued long term support for this equipment. These efforts include

Complete design effort on an advanced system,

Continue analysis of upgraded technical requirements

Continue efforts to improve performance,

Complete development of improved performance analysis techniques.

Program Element: 63570N
DoD Mission Area: 238 - Other Naval Warfare

Title: Advanced Nuclear Reactor Components and Systems Development
Budget Activity: 4 - Tactical Programs

Continue engineering studies and tests

Continue development of design and analysis methods and provide design, analysis and test support required to solve naval reactor plant

Continue development of advanced design

4. (U) FY 1984 Planned Program: Continue instrumentation and control equipment upgrading program and long term support program. These efforts include design, testing, qualification and installation of advanced design equipment. Continue design of

Initiate development of

Continue to perform engineering analyses to support design improvements

Continue efforts to improve performance and to lead to a better understanding of

Continue the following developmental efforts:

Continue improvement program including engineering studies and tests. Examine

Continue to provide design, analysis and test support for naval reactor plant

Pursue investigations of improved

Complete development of advanced design

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63571N
Title: Shipboard Physical Security
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,016	4,594	6,560	6,091	Continuing	Continuing
S0812	Nuclear Weapons Security	4,016	4,594	5,950	5,394	30,733	60,801
	Quantity			(D/OT&E)	(D/OT&E)		(6)
S1580	Radiological Control and Health	0	0	172	162	Continuing	Continuing
T1581	Personnel Protection & Survival	0	0	438	535	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: S0812 - Nuclear Weapons Security - Within the U.S. Navy a need exists for a physical security system which is capable of detecting, classifying and providing a response to threats targeting ship's nuclear weapon assets. Such a system should be compatible with and integrated into the ship's total physical security system. This program element includes all measures, technical and procedural, for the improvement of shipboard nuclear weapons security. These measures will provide for the development, test, and evaluation of technology for the physical security of nuclear weapons aboard ships and submarines. Typical efforts will include investigation of intrusion detection devices, barriers, exclusion areas, and automatic lethal and non-lethal devices for use within the shipboard environment. Recognizing the immediacy of the problem, the program element will include the investigation and identification of those items, both technical and procedural, which may be rapidly implemented to improve the current level of shipboard nuclear weapon security in the fleet. S1580 - Radiological Control & Health (RADCON) - Provides required improvement in nuclear weapon intrinsic radiation (gamma and neutron) shielding, calculations and mixed field (neutron and gamma) dosimetry. T1581 - Personnel Protection and Survival - Provides for test and evaluation of protective clothing and accessories for male and female shipboard personnel. The clothing and accessories should protect against all climatic conditions and man-made hazards and exposures such as fire, radiation, explosives, chemical warfare, etc.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0812 - Nuclear Weapons Security - Construction of the Shipboard Environmental Simulation Facility will begin and be completed. Specification of an engineering development model of an existing component based shipboard nuclear weapon security system(s) will be completed. Procurement of advanced development models of shipboard nuclear weapon security system(s) will be initiated. Technology demonstrations of security system components for use in automatic personnel tracking and denial systems will be completed. The development of improved ship's security force tactics will be completed and

Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

recommended for introduction to the fleet. System formulation of a ship's nuclear weapon security system incorporating all technology developments will continue. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated. S1580 - Radiological Control and Health (RADCON) - Improve the current computer program for calculating shielding required for nuclear weapons magazines. Better estimates of shielding requirements would significantly reduce cost. Personnel dosimetry required for carriers, tenders, and shore activities is to be improved. Personnel could receive a significant portion of the administrative limits of exposure in the current 6-8 week cycle. Cycle time must be reduced to allow radiological control/radiation health program awareness of the level of exposure and take measures to prevent doses in excess of limits. This will require decentralization of dosimetry capability to other facilities. Higher dose levels may occur with the attendant problem of intercalibration. T1581 - Personnel Protection and Survival - Shipboard testing of significant quantities of protective clothing items developed under the Exploratory Development Program is needed to insure usability and effectiveness in the shipboard environment. The increase in funding in this program element from FY 1982 to FY 1983 is due to the addition of projects S1580 and T1581, and to the funding of the Shipboard Environmental Simulation Facility to completion in Project S0812. As Projects S1580 and T1581 are continuing programs, their funding profiles include outyear escalation and encompass all work and development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) S0812 - Nuclear Weapons Security - The changes between the funding profile in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary represent a slight increase ($247) in total estimated cost for the program. This is due to cost increases in FY 1983 of $873 to fund the Shipboard Environmental Simulation Facility to completion in accordance with the program schedule. Changes in FY 1981 (+$15) & 1982 (-$66) were due to refinements of costs including inflation. Projects S1580 and T1581 are new starts in FY 1983 and were not reflected in last year's Descriptive Summary.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,600	4,001	4,660	5,077	36,702	60,554
S0812	Nuclear Weapons Security	4,600	4,001	4,660	5,077	36,702	60,554
	Quantity					(OT&E)	(6)

Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
(U) OTHER APPROPRIATION FUNDS:						
S0812 - Not applicable.						
S1580						
O&MN	300	703	642	637	Continuing	Continuing
OPN	1,415	1,230	4,011	4,283	1,491	15,430

Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0812 - Nuclear Weapons Security - The nuclear weapons security program is directly related to the world-wide terrorist threat culminating in the use of a nuclear weapon for international blackmail. In addition, [redacted] Existing shipboard security depends upon guards and simple electrical circuits, locks, and hasps. [redacted] A substantial and successful effort has gone into development of more sophisticated physical security devices for land based applications. None of this effort has been directed to the testing of this technology in the shipboard environment. S1580 - Radiological Control and Health - The Nuclear Weapons Radiological Controls Program was created to reduce the dose to personnel from nuclear weapons storage handling and maintenance. To achieve this result without impairing operations, better knowledge of the shielding fields present or new construction of shielding must be obtained. T1581 - Personnel Protection and Survival - Previous limited testing of protective garments developed under the Exploratory Development Program has proven to be inadequate and an inefficient use of limited resources. More extensive testing of protective clothing items is necessary to insure effectiveness of these items prior to introduction to the fleet. Testing will be conducted in a fleet shipboard environment.

(U) RELATED ACTIVITIES: S0812 - Nuclear Weapons Security - Effort is coordinated with Physical Security Equipment Action Group in the Office of the Under Secretary of Defense for Research and Engineering, Air Force Physical Security Systems Directorate, Army Program Office for Physical Security Equipment, Defense Nuclear Agency, and related Navy work coordinated through the Office of the Chief of Naval Operations (OP-403, Physical Security Branch). S1580 - Radiological Control and Health - Not applicable. T1581 - Personnel Protection and Survival - Coordination with the Army Natick Laboratory is carried out on projects of mutual interest.

(U) WORK PERFORMED BY: S0812 - Nuclear Weapons Security - In House: Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; and Navy Personnel Research and Development Center, San Diego, CA. Contractors: Dynatrend, Inc., Woburn, MA; BDM CO., McLean, VA; Mission Research Corp., Santa Barbara, CA; Analytic Advisory Group, Inc., McLean, Va.; R. Carson and Assoc., Rockville, MD; RCA Corp., Somerville, NJ. S1580 - Radiological Control and Health - In House: Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Weapons Evaluation Facility, Albuquerque, NM. T1581 - Personnel Protection and Survival - In House: Navy Clothing and Textile Research Facility (NCTRF), Natick, Massachusetts. Contractors: None.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0812 - Nuclear Weapons Security - In May 1978, the Shipboard Nuclear Weapons Security Office was established with the Naval Surface Weapons Center, White Oak, MD, as Technical Agent to execute the Shipboard Nuclear Weapons Security Program. The requirements planning was begun in detail and the major Task Areas were defined. The Task Areas are as follows: (1) Threat and Vulnerability Analysis, (2) Mission Analysis, (3) Technology Assessment, (4) Shipboard Environ-

Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

mental Effects, and (5) Shipboard Environmental Simulation. During the first quarter of FY 1979 the methodology to perform a system analysis for threat, vulnerability, and mission analysis was developed, hardware to develop a computer system simulation facility was procured, the capabilities of existing shipboard environmental testing facilities were defined, and a categorization of the technology capability of existing physical security systems for shipboard use was begun. An initial report of the threat and vulnerability of shipboard nuclear weapons was completed and validated by the Naval Intelligence Command. Requirements analysis was completed with issuance of final report documenting shipboard nuclear weapon vulnerability analysis of eleven representative ship classes to the 1990's projected threat level. The technology capability of existing physical security systems for shipboard use was defined, an initial concept of a land based ship's environmental simulation facility was completed, and a computer modeling facility to mathematically simulate the operation of a shipboard physical security system was made operational and system modeling development effort completed with turn-over of facility and operating models. Measurements needed to define the environmental characteristics of shipboard nuclear weapon security were initiated. The computer modeling and simulation of shipboard nuclear weapon security systems was begun with major input to system concept formulation for the examination of an engineering development model shipboard nuclear weapon security system based on existing service approved equipment (not necessarily Navy approved). A final vulnerability report on the use/misuse of high security locks and hasps aboard ship was issued. A shipboard questionnaire survey for identification of security problems related to guard force capabilities was initiated and distributed to selected fleet elements, collated and a final report issued. System concept formulation for an engineering development model of an existing component based shipboard nuclear weapon security system(s) was completed. The survey and assessment of existing technology were completed with a final report which provides input to the Shipboard Environmental Simulation Facility and System Concept Formulation and Assessment task areas.

2. (U) FY 1982 Program: S0812 - Nuclear Weapons Security - Technology Development task area is being initiated. Feasibility models of advanced security systems technology (Personnel Tracking, Denial Systems) will be delivered. System formulation and selection of an existing component based shipboard nuclear weapon security system(s) will be completed; advanced development model procurement will be initiated. The architectural engineering for the Shipboard Environmental Simulation Facility building design will be completed. The Shipboard Environmental Simulation Test Cell design will be completed. Initiate construction contracts for both the building and test cells. System concept formulation of a shipboard engineering improvement based shipboard nuclear weapon(s) will be completed. The effectiveness of using shipboard computers to assist in handling the administrative details associated with shipboard nuclear weapon security will be evaluated. Analysis of shipboard nuclear security and response force tactics and armaments will be completed with recommendations of optimum force composition, tactics and armaments suite for defense of shipboard nuclear weapons.

3. (U) FY 1983 Planned Program: S0812 - Nuclear Weapons Security - Initiate procurement of engineering development models of existing components based shipboard nuclear weapon security systems. Complete competitive procurement of feasibility models to demonstrate future shipboard nuclear weapon security system technology. Start and complete construction of the Shipboard Environ-

Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

mental Simulation Facility. Implement shipboard nuclear weapons security and response force tactics and armaments optimum suite for defense of shipboard nuclear weapons. Continue system formulation of fully capable system incorporating all technology development required for post 1990 threat. S1580 - Radiological Control and Health - Initiate shielding studies and continue shielding development efforts for carriers. The improved shielding program would allow shielding requirements to be significantly reduced (e.g., if improved computer code existed today, shielding costs of CVN 71 could be reduced by 150 thousand and retrofit costs could be reduced by a factor of two). Initiate dosimetry development efforts addressing problems of carriers, tenders and shore activities. T1581 - Personnel Protection and Survival - Currently Navy Clothing and Textile Research Facility is developing, under the Exploratory Development Program, fire retardant clothing for flight deck personnel, women's crash/rescue fire proximity clothing, abrasion resistant coatings for vacuum deposited aluminized fabrics, direct molded sole-welt safety footwear, and marine assault suits. Beginning in FY 1983 physiological testing of the above items will be performed prior to recommendation for adoption.

4. (U) FY 1984 Planned Program: S0812 - Nuclear Weapons Security - System formulation of the fully capable system will continue; testing of the technology feasibility model for use in this system will continue. The Shipboard Environmental Simulation Facility will be brought on line. An advanced development model of a shipboard nuclear security system, incorporating engineering design improvements to allow shipboard operation, will be delivered for the Shipboard Environmental Simulation Facility and ship test. Complete procurement of engineering development models of existing component based shipboard nuclear weapon security system(s) for operational test and evaluation. S1580 - Radiological Control and Health - Continue shielding development efforts for non-FBM tenders, surface combatants, attack submarines and shore activities. Continue efforts toward development of improved field dosimeters. Initiate studies to develop a flexible, highly neutron-attenuating plastic shielding material. Initiate development of improved equipment for the measurement of neutron energy spectra. T1581 - Personnel Protection and Survival - The development and service evaluation of combination firefighters ensemble and fire retardant handware with insulated liner will be carried out. Operational Evaluation of abrasion coatings for aluminized fabrics and concurrent physiological evaluation of these protective garments will be performed.

5. (U) Program to Completion: S0812 - Nuclear Weapons Security - An engineering development model of a shipboard nuclear weapon security system based upon existing security equipment will complete operational test and evaluation with [ ] The advanced development model of the system using all technology required for post 1990 capability will be tested in the Shipboard Environmental Simulation Facility and at sea during FY 1988-FY 1989. S1580 - Radiological Control and Health - Development of a computer code for calculation of neutron dose suitable for ships is to be produced. A dosimetry system will be developed which will allow quicker readout of neutron dose results. Continue efforts on carrier shielding. Continue efforts on dosimetry for carriers, tenders, and shore activities. T1581 - Personnel Protection and Survival - Evaluation of abrasion resistant coatings will be concluded. Evaluation of damage control clothing, liquid oxygen handlers clothing and safety fire retardant handwear will be performed. Physiological testing of protective garments developed under the Exploratory Development Program will continue to be carried out beyond FY 1984.

Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not applicable.

Project: S0812
Program Element: 63571N
DoD Mission Area: 235 - Naval Warfare Support

Title: Nuclear Weapons Security
Title: Shipboard Physical Security
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The nuclear weapons security program is directly related to the world-wide terrorist threat culminating in the use of a nuclear weapon for international blackmail. In addition, [redacted] Existing shipboard security depends upon guards and simple electrical circuits, locks, and hasps. [redacted] A substantial and successful effort has gone into development of more sophisticated physical security devices for land based applications. None of this effort has been directed to the testing of this technology in the shipboard environment.

(U) RELATED ACTIVITIES: Effort is coordinated with Physical Security Equipment Action Group in the Office of the Under Secretary of Defense for Research and Engineering, Air Force Physical Security Systems Directorate, Army Program Office for Physical Security Equipment, Defense Nuclear Agency, and related Navy work coordinated through the Office of the Chief of Naval Operations (OP-403, Physical Security Branch).

(U) WORK PERFORMED BY: In House: Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Civil Engineering Laboratory, Port Hueneme, CA; and Navy Personnel Research and Development Center, San Diego, CA. Contractors: Dynatrend, Inc., Woburn, MA; BDM CO., McLean, VA; Mission Research Corp., Santa Barbara, CA; Analytic Advisory Group, Inc., McLean, Va.; R. Carson and Assoc., Rockville, MD; RCA Corp., Somerville, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In May 1978, the Shipboard Nuclear Weapons Security Office was established with the Naval Surface Weapons Center, White Oak, MD, as Technical Agent to execute the Shipboard Nuclear Weapons Security Program. The requirements planning was begun in detail and the major Task Areas were defined. The Task Areas are as follows: (1) Threat and Vulnerability Analysis, (2) Mission Analysis, (3) Technology Assessment, (4) Shipboard Environmental Effects, and (5) Shipboard Environmental Simulation. During the first quarter of FY 1979 the methodology to perform a system analysis for threat, vulnerability, and mission analysis was developed, hardware to develop a computer system simulation facility was procured, the capabilities of existing shipboard environmental testing facilities were defined, and a categorization of the technology capability of existing physical security systems for shipboard use was begun. An initial report of the threat and vulnerability of shipboard nuclear weapons was completed and validated by the Naval Intelligence Command. Requirements analysis was completed with issuance of final report documenting shipboard nuclear weapon vulnerability analysis of eleven representative ship classes to the 1990's projected threat level. The technology capability of existing physical security systems for shipboard use was defined, an initial concept of a land based ship's environmental simulation facility was completed, and a computer modeling facility to mathematically simulate the operation of a shipboard physical security system was made operational and system modeling development

Project: S0812 Title: Nuclear Weapons Security
Program Element: 63571N Title: Shipboard Physical Security
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

effort completed with turn-over of facility and operating models. Measurements needed to define the environmental characteristics of shipboard nuclear weapon security were initiated. The computer modeling and simulation of shipboard nuclear weapon security systems was begun with major input to system concept formulation for the examination of an engineering development model shipboard nuclear weapon security system based on existing service approved equipment (not necessarily Navy approved). A final vulnerability report on the use/misuse of high security locks and hasps aboard ship was issued. A shipboard questionnaire survey for identification of security problems related to guard force capabilities was initiated and distributed to selected fleet elements, collated and a final report issued. System concept formulation for an engineering development model of an existing component based shipboard nuclear weapon security system(s) was completed. The survey and assessment of existing technology was completed with a final report which provides input to the Shipboard Environmental Simulation Facility and System Concept Formulation and Assessment task areas.

2. (U) FY 1982 Program: Technology Development task area is being initiated. Feasibility models of advanced security systems technology (Personnel Tracking, Denial Systems) will be delivered. System formulation and selection of an existing component based shipboard nuclear weapon security system(s) will be completed; advanced development model procurement will be initiated. The architectural engineering for the Shipboard Environmental Simulation Facility building design will be completed. The Shipboard Environmental Simulation Test Cell design will be completed. Initiate construction contracts for both the building and test cells. System concept formulation of a shipboard engineering improvement based shipboard nuclear weapon(s) will be completed. The effectiveness of using shipboard computers to assist in handling the administrative details associated with shipboard nuclear weapon security will be evaluated. Analysis of shipboard nuclear security and response force tactics and armaments will be completed with recommendations of optimum force composition, tactics and armaments suite for defense of shipboard nuclear weapons.

3. (U) FY 1983 Planned Program: Initiate procurement of engineering development models of existing components based shipboard nuclear weapon security systems. Complete competitive procurement of feasibility models to demonstrate future shipboard nuclear weapon security system technology. Start and complete construction of the Shipboard Environmental Simulation Facility. Implement shipboard nuclear weapons security and response force tactics and armaments optimum suite for defense of shipboard nuclear weapons. Continue system formulation of fully capable system incorporating all technology development required for post 1990 threat.

4. (U) FY 1984 Planned Program: System formulation of the fully capable system will continue; testing of the technology feasibility model for use in this system will continue. The Shipboard Environmental Simulation Facility will be brought on line. An advanced development model of a shipboard nuclear security system, incorporating engineering design improvements to allow shipboard operation, will be delivered for the Shipboard Environmental Simulation Facility and ship test. Complete procurement of engineering development models of existing component based shipboard nuclear weapon security system(s) for operational test and evaluation.

Project: S0812 Title: Nuclear Weapons Security
Program Element: 63571N Title: Shipboard Physical Security
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: An engineering development model of a shipboard nuclear weapon security system based upon existing security equipment will complete operational test and evaluation with [redacted]. The advanced development model of the system using all technology required for post 1990 capability will be tested in the Shipboard Environmental Simulation Facility and at sea during FY 1988-FY 1989.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0812	Nuclear Weapons Security	4,016	4,594	5,950	5,394	30,733	60,801

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63576N
Title: Chalk Eagle
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	6,401	13,896	Continuing	Continuing
R1578	Chalk Eagle	0	0	6,401	13,896	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Details of this program are of a higher classification and of limited access nature.

(U) BASIS FOR FY 1983 RDT&E REQUEST: As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63578N
DoD Mission Area: 238 - Other Naval Warfare

Title: A4W/A1G Nuclear Propulsion Plant
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	10,624	11,849	12,238	12,706	Continuing	Continuing
S0387	A4W/A1G Aircraft Carrier Type Dual Reactor Nuclear Propulsion Plant	10,624	11,849	12,238	12,706	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element supports a comprehensive program directed toward the development, test, and evaluation of a two reactor,] nuclear propulsion plant for use in aircraft carriers (NIMITZ Class and future CVN's). The two reactor plant has about the same total power as the eight reactor plant installed in the USS ENTERPRISE. The new cores developed under this program have an expected core lifetime of about 15 years compared to three years for the initial USS ENTERPRISE cores.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development of a reactor servicing system, [ ] support of operational evaluation and testing of reactors and reactor plant equipment. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: the decrements in FY 1982 and FY 1983 funding estimates (13 and 432, respectively) are the result of a revised estimate of program needs in FY 1983 and a downward adjustment in the inflation factors for both fiscal years.

Program Element: 63578N
DoD Mission Area: 238 - Other Naval Warfare

Title: A4W/A1G Nuclear Propulsion Plant
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	10,766	10,624	11,862	12,670	Continuing	Continuing
S0387	A4W/A1G Aircraft Carrier Type Dual Reactor Nuclear Propulsion Plant	10,766	10,624	11,862	12,670	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: The CVN 68 Class Selected Acquisition Report, which is updated on a quarterly basis, identifies other appropriation funding provided in support of NIMITZ Class Aircraft Carriers.

Program Element: 63578N
DoD Mission Area: 238 - Other Naval Warfare

Title: A4W/A1G Nuclear Propulsion Plant
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project is a comprehensive program directed toward the development, test, and evaluation of a two reactor, nuclear propulsion plant for use in aircraft carriers (NIMITZ Class and future CVN's). The two reactor plant has about the same total power as the eight reactor plants installed in the USS ENTERPRISE, while incorporating simplicity of operation and reduced requirements for operating personnel. The A4W plant is the largest naval nuclear propulsion plant yet developed. the newest ones are expected to have a core lifetime of about 15 years compared to three years for the initial USS ENTERPRISE cores.

(U) RELATED ACTIVITIES: Work conducted under this project is closely coordinated with other naval nuclear propulsion research and development projects and research and development work on nuclear reactor plants conducted by the Department of Energy, Office of the Deputy Assistant Secretary for Naval Reactors.

(U) WORK PERFORMED BY: Contractors: Westinghouse Electric Corporation, Bettis Atomic Power Laboratory and Plant Apparatus Division, Pittsburgh, Pennsylvania.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In FY 1975, the first ship of the class, USS NIMITZ (CVN 68), became operational. This milestone was achieved after many years of research and development effort that included developments in essentially all aspects of naval nuclear propulsion plant technology

A second aircraft carrier of the NIMITZ Class, USS DWIGHT D. EISENHOWER (CVN 69), was commissioned in FY 1978. Operation of the A4W/A1G nuclear propulsion plant components and systems continues to be evaluated using data received from the carrier prototype reactor and from the USS NIMITZ and USS DWIGHT D. EISENHOWER. These data are used to confirm continued suitability of these components and systems for use in naval nuclear propulsion plants and to identify where improvements are necessary. Structural integrity of the mechanical design of propulsion plant components has been verified through detailed analysis Improved design features and operating procedures to improve plant reliability and performance have been developed.

Research and development efforts related to the construction and acceptance test program for the CARL VINSON (CVN 70) and reactor plant construction of CVN 71 were provided. Planning and support were furnished for the modification and testing of reactor plant systems and components during USS NIMITZ availabilities. Development was initiated for Development of refueling and maintenance system equipment

Program Element: 63578N
DoD Mission Area: 238 - Other Naval Warfare

Title: A4W/A1G Nuclear Propulsion Plant
Budget Activity: 4 - Tactical Programs

for NIMITZ Class carriers continued. Fabrication of the initial refueling machine and associated equipment commenced. A mock-up check out program to identify any potential problems in the design of the refueling machine and associated equipment was developed.

2. (U) FY 1982 Program: Complete technical support of the CVN 70 reactor plant construction. Continue technical support of the CVN 71 reactor plant construction. Continue testing and analysis of operating NIMITZ Class ships to identify and resolve reactor plant problems. Continue orderly development of refueling and servicing equipment including manufacturing effort for the lead refueling components.

This equipment will be available

Provide plant engineering support for USS NIMITZ and USS EISENHOWER Selected Restricted Availabilities and develop testing methods and procedures in preparation for USS NIMITZ overhaul.

Initiate development of improved designs for remaining reactor plant instrumentation and control equipment.

3. (U) FY 1983 Planned Program: Continue follow-on and testing of NIMITZ Class reactor plants in order to ensure safe reactor performance and operation, to identify and resolve reactor plant problems,

These efforts include performing analyses of reactor cores.

Continue technical support for CVN 71 reactor plant construction efforts. Continue development of lead unit and associated equipment for refueling NIMITZ Class ships.

Commence fabrication on the M-130 module holders and loading adapter. Provide plant engineering support for CVN 70 Post Shakedown Availability and complete preparation for USS NIMITZ reactor plant overhaul by evaluating the results of the pre-overhaul testing effort. Continue development of new types of reactor instrumentation and control equipment. Complete development work on improved system.

4. (U) FY 1984 Planned Program: Continue follow-on and testing of NIMITZ Class reactor plants in order to ensure safe reactor plant performance and operation, Continue technical support of reactor plant construction efforts for CVN 71. Continue development of lead unit and associated equipment for refueling NIMITZ Class ships. Provide containers for irradiated component shipments. Provide plant engineering support for USS EISENHOWER availability and for USS NIMITZ reactor plant overhaul. Continue development of new types of instrumentation and

Program Element: 63578N
DoD Mission Area: 238 - Other Naval Warfare

Title: A4W/A1G Nuclear Propulsion Plant
Budget Activity: 4 - Tactical Programs

control equipment system. Complete development of an improved

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63579N
Title: D2W Nuclear Propulsion Reactor
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,025	10,449	9,337	9,339	Continuing	Continuing
S0388	D2W Nuclear Propulsion Reactor	11,025	10,449	9,337	9,339	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The D2W nuclear propulsion plant project supports development of improved propulsion plant systems and components which are compatible with the longer life D2W reactor core currently under development by the Department of Energy. The D2W reactor core is planned for use in FY 1978. Current plans also call for installation of the D2W reactor core in CGN's 36 through 41 during refueling.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue work to apply the D2W reactor core to CGN's 36 through 41 in the areas of engineering, component design compatibility, plant arrangements, shielding, fluid systems and instrumentation and control systems. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profiles shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: the decrements in FY 1982 and FY 1983 estimates (12 and 328, respectively) are the result of a revised estimate of program needs in FY 1983 and a downward revision of inflation factors for both fiscal years.

Program Element: 63579N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: D2W Nuclear Propulsion Reactor
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,583	11,025	10,461	9,665	Continuing	Continuing
S0388	D2W Nuclear Propulsion Reactor	11,583	11,025	10,461	9,665	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 63579N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: D2W Nuclear Propulsion Reactor
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project supports the development of improved propulsion plant systems and components which are compatible with the longer life D2W reactor core currently under development by the Department of Energy. This core is expected to have a [redacted] longer lifetime than the D1G cores which are currently installed in CGN 36 and CGN 38 Class cruisers. Technological advances in system and component design are being developed and incorporated into the design of reactor plant components for the D2W plant. These advanced designs will result in longer component life, increased reliability, and reduced maintenance requirements. D2W reactor cores and improved components are currently planned for installation in [redacted] six CGN 36 and 38 Class cruisers.

(U) RELATED ACTIVITIES: Work conducted under this project is closely coordinated with the efforts in other naval nuclear propulsion research and development projects, [redacted] the research and development work on nuclear reactors and propulsion plants conducted by the Department of Energy, Office of the Deputy Assistant Secretary for Naval Reactors.

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

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Analyses of the D2W prototype reactor plant operation and test results were conducted in order to evaluate nuclear, mechanical and physical performance in support of the core's application to naval nuclear propulsion plants. This effort included investigations of [redacted] a submarine.

The program to improve [redacted] performance characteristics [redacted] continued. This work included:

[redacted]

[redacted] and

Program Element: 63579N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: D2W Nuclear Propulsion Reactor
Budget Activity: 4 - Tactical Programs

Development of materials, designs and components

Work continued on the design of equipment for CGN 36 and 38 Class ships. Planning continued for testing D2W servicing equipment. Conducted test programs for D2W core components and performed in order to confirm D2W core component design reliability and design adequacy. Developed analytic methods for predicting. Investigations continued into the cause and prevention. Additionally, overall materials performance testing was performed in order to ensure reliability of materials data used in design of structural materials.

2. (U) FY 1982 Program: Continue design of reactor servicing/refueling equipment necessary for the backfit of the D2W reactor core into CGN 36 and 38 Class ships. Conduct shield design development and performance of required shield analyses. Complete D2W servicing equipment testing. Continue test programs for D2W core components, in order to confirm D2W core component design reliability and adequacy. Continue development of designs for operating reactor components. Continue testing. Continue design efforts on Continue effort technology to improve performance and reliability of plant components in support of extended plant lifetime. Continue qualification testing of Evaluate different designs to improve performance. Continue testing. Initiate development to improve the performance of the steam equipment. This effort is essential to adapt these to the higher power requirements associated with the D2W core. Complete investigations

3. (U) FY 1983 Planned Program: Continue design effort for the backfit of the D2W reactor into the CGN 36 and 38 Class which will be used for CGN ship refuelings and for backfit refuelings. Conduct shield design development and analyses of performance of required

shielding. Conduct test programs for D2W core components, Continue preparation of D2W core design certifications to confirm core design adequacy. Continue for operating systems. Complete modifications to Continue design efforts Continue the program to improve performance and to ensure reliability of plant components. Conduct qualification testing Continue development Continue investigations

4. (U) FY 1984 Planned Program: Continue design effort for the backfit of the D2W reactor into the CGN 36 and 38 Class Prepare specifications for refueling the D2W prototype reactor. Conduct test programs for D2W core components, design certifications to confirm design adequacy. Continue to prepare D2W core provide an advanced design system. This effort will Continue design efforts performance and to ensure reliability of plant components. Continue efforts to improve Continue qualification testing Continue testing The

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63582N
Title: Combat System Integration
DoD Mission Area: 344 - Tactical Command and Control
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	988	7,340	17,138	19,330	Continuing	Continuing
S0164	Combat System Integration	0	3,327	3,978	3,436	Continuing	Continuing
S1085	Combat System Engineering	988	4,013	4,917	5,119	Continuing	Continuing
S1591	Combat System Interface	*	*	8,243	10,775	Continuing	Continuing

*Funded in O&M,N prior to FY 1983

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element accomplishes installation and integration engineering of digital interface for surface ship combat systems. These projects currently include total ship Combat Systems Engineering for major surface combatant and carrier upgrade programs.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Combat System Integration Project (S0164) codes, debugs, tests and delivers an operational program for the AN/SLQ-32 and the digital interface with Combat Direction Systems and LAMPS MK III Electronic Support Measure. Design specifications and coding of LAMPS III related functions of the AN/SLQ-32 have been initiated. The Combat Systems Engineering project (S1085) continues or initiates the engineering efforts associated with the combat system upgrade design, development of shore site test beds and conduct of Combat System Computer Program network validation for the following ship classes: DD 963, CGN 36, CGN 38, CG 16/26 and DDG-993. Additional FY 1983 funding over FY 1982 will support the development of computer simulations and test programs necessary to enable Combat System interface and integration testing of computer programs for these same ship classes. The Combat System Interface project (S1591) is a new start in FY 1983 that was previously funded in OM&N and will provide development of Combat Direction System computer program changes required to support Combat System improvements planned for installation during Ship Regular Overhauls. The integration of the weapons and sensor improvements such as SM2, New Threat Upgrade, Common Weapon Control System/TOMAHAWK, AN/SPS-49 Automatic Target Detection, SYS-2, often requires interface changes to the Combat Direction System computer programs. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: In FY 1982 the Combat Systems Engineering

Program Element: 63582N
DoD Mission Area: 344 - Tactical Command and Control

Title: Combat System Integration
Budget Activity: 4 - Tactical Programs

Project (S1085) and the Combat System Integration Project (S0164) were decreased by $206 and $48 respectively as the result of a downward adjustment in the inflation factors for both fiscal years and a directed reduction for the use of contractor support services in FY 1982. The FY 1983 program has increased by $7,411 consisting of a restoration of funding of $2,505 for the Combat System Integration Project (S0164) in this program element to support AN/SLQ-32 integration and a decrease of $3,337 for the Combat System Engineering Project (S1085) in the support of interface and integration testing of computer programs for Surface Combatant Ships and an increase of $8,243 for the "new start" Combat System Interface Project (S1591) to provide development of Combat Direction System interface changes.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,054	1,000	7,594	9,727	Continuing	Continuing
S0164	Combat System Integration	4,169	0	3,375	1,473	Continuing	Continuing
S1085	Combat System Engineering	3,885	1,000	4,219	8,254	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not Applicable.

Program Element: 63582N
DoD Mission Area: 344- Tactical Command and Control

Title: Combat System Integration
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The increasing complexity and interdependence of new systems being introduced mandates that practical and effective technology of integrated combatant system design be developed to validate and define ship performance objectives. Part of a combat system's performance is inherent in the selection of the individual equipment that comprise the combat system; the remaining portion depends upon the way these equipments are made to interrelate with each other. The purpose of Combat System Engineering is to develop shipboard integration and installation interrelationships to satisfy previously defined performance requirements. Proper systems engineering and integration of equipments into combat systems are required to relate the functions of surveillance, combat management and engagement. Shipboard surveillance capabilities and information from off-board sensors must be selected and integrated into a system that provides earliest warning of impending hostile attack and provides command with a coherent, accurate picture of that engagement. The top level combat system engineering does not duplicate the individual warfare areas system/equipment integration efforts but rather is dependent upon these efforts. There is a need to evaluate the impact of all proposed additional equipment/subsystems to be installed on ships. This evaluation has to consider the full impact of the proposed new equipment/subsystems on the existing Combat Direction System. This impact has to be evaluated early so that decisions can be made as to the extent of integration that is affordable and operationally required. This effort has to be started in conjunction with the initiation of the equipment/subsystem Proposed Military Improvement. When the various improvements are approved, they have to be blocked into achievable Ship Class Improvement packages and ship improvement baselines established with time to ensure that blocks of improvements have been engineered into effective combat systems and can be achieved within time and dollar overhaul period constraints.

(U) RELATED ACTIVITIES: This program element performs systems integration and engineering of equipment and modifications developed under other PEs including: PE 25620N, ASW Combat System Integration; PE 25623N, Surface Ship Sonar Modernization; PE 63553N, Surface Anti-Submarine Warfare; PE 63609N, Surface Launched Munitions; PE 64352N, Surface Launched Weaponry Ship Systems; PE 64358N, Close-In Weapon System (PHALANX); PE 64361N, NATO SEASPARROW; PE 64369N, 5" Rolling Airframe Missile; PE 64508N, Radar Surveillance Equipment; PE 64518N, Combat Information Center Conversion; PE 64554N, Surface Electronic Warfare (Engineering); PE 64607N, Electro Optics Sensor Development; PE 64608N, Joint Army/Navy Semi-Active Laser Guided Projectile Engineering; PE 64652N, Gun Systems Improvement Program; and PE 64713N, Tactical Towed Array Sonar. PE 63582N performs technical evaluation of combat system design concepts developed under PE 63568N Combat System Architecture and PE 63519N Advanced Command Data Systems so that integration concepts developed under these efforts can be effectively applied to ship modernization.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center - Dahlgren Lab, Dahlgren, VA and White Oak Lab, Silver Spring, MD; Naval Ocean Systems Center, San Diego, CA; Fleet Combat Direction System Support Activity, Dam Neck, VA and San Diego, CA; Integrated Combat Systems Test Facility, San Diego, CA; Naval Sea Systems Command, Washington, DC; and Naval Electronic Systems Command, Washington, DC. Contractor: Systems Consultants, Inc., Washington, DC; Applied Physics Laboratory/Johns Hopkins University, Silver Spring, MD; and Automation Industries, Inc., Silver Spring, MD. Others to be determined by procurement solicitation.

Program Element: 63582N
DoD Mission Area: 344- Tactical Command and Control

Title: Combat System Integration
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0164: Developed mobile training van used to train personnel to respond rapidly to the Anti-Ship Missile Threat. Completed Ship Anti-Missile Integrated Defense program in 20 ships of DD-710, DDG-2, and DLG-28 classes. Developed alternate Electronic Warfare interface equipment, MK 28 Mod 1 Chaff Rocket System, and Navy Tactical Data System Anti-Ship Missile Defense computer programs. Conducted feasibility testing of automatic radar detection system and Anti-Ship Missile Defense drone decoy. Finished simulation studies for Anti-Ship Missile Defense equipment relative contribution model. Tested DDG Tactical Data System, Junior Participating Tactical Data System and MK 13 Weapons Direction System. Defined NATO SEASPARROW integration requirements for aircraft carriers. Wrote Electronic Warfare Systems operational procedures and Anti-Ship Missile Defense Combat Systems Integration Top Level Specifications. Produced Integration Design Specification for all ship classes describing the effort required to integrate the combat system for each class. Developed and finalized the Integration Design Specification for AN/SLQ-32(V) Anti-Ship Missile Defense Electronic Warfare System, ships combat system and LAMPS MK III Electronic Support Measure. Developed Navy Tactical Data System and AN/SLQ-32(V) computer program design concepts prior to development of program performance and design specifications. Produced Integration Requirements Documents for CVN-65, DD-963, AOE-1 and AOR-1 ship classes for guidance in generating detailed design/installation data and specifications. Completed draft Anti-Ship Missile Defense Combat System Integration AN/SLQ-32(V) Computer Program Performance/Design Specifications to integrate AN/SLQ-32(V) with Navy Tactical Data System/Tactical Data System. Continued assessment of impact of integrating Shipboard Signal Exploitation System OUTBOARD with Navy Tactical Data System. Developed the computer program for the integration of AN/SLQ-32 (V-2) (without LAMPS MK III interface) with ship's Tactical Data System. This program was completed in FY 1981 and deferred to the FFG-7 Combat System Test Center. Developed draft Integration Requirements Specification for Rolling Airframe Missile Weapon System integration with ships combat systems. Developed Integrated Design Specifications for LAMPS MK III AN/ALQ-142 Electronic Warfare interfaces between Navy Tactical Data System and AN/SLQ-32(V) Electronic Warfare for DDG-47, DD-963, and FFG-7 class ships. Accomplished initial development of the *AN/SLQ-32(V)2 Computer Program Performance Specification to interface digitally with the Combat Direction System and LAMPS MK III.* Combat System Engineering was also accomplished under S0164 as follows: Developed combat systems top level requirements for DD 963 class Phase I modernization, to determined design approach of implementing Anti Surface Warfare improvements in Phase II and Anti-Submarine Warfare sensors and control system in later phases. S1085: Developed baseline technical documentation and analytical studies for FF 1052, CG 16/26 and CV/CVNs. Conducted initial studies and initiated management and technical plans for CGN-38 SM-2 upgrade. Initiated development of plans and simulations for CV, CGN 38 and DD 963 class testing at Integrated Combat System Test Facility.

2. (U) FY 1982 Program: S0164: The AN/SLQ-32(V)2 Computer Program Performance Specifications to interface digitally with Combat Direction System and LAMPS MK III will be completed as well as the Computer Program Design Specifications. Initiate coding and debugging of the computer program and deliver a test load by the end of FY 1982. Commence development of test plan and procedures needed for acceptance testing of the program. Continue development of simulations and diagnostic routines to support computer program testing. S1085: Continue Combat System Engineering programs on DD 963, FFG-7, CGN 38 ship classes and carriers. Initiate

management and technical plans for DDG-993 upgrade to SM-2/New Threat Upgrade. This engineering will include further development of technical documentation, including analysis of alternative combat system designs, and development of combat systems design requirements. Continue development of DD 963 simulations for use at Integrated Combat System Test Facility. Initiate development of simulations and plans to support CGN-38 testing at Integrated Combat Systems Test Facility. Begin development of data correlation, analysis, and display system for support of HARPOON, particularly on non-Tactical Data System ships.

3. (U) FY 1983 Planned Program: S0164: Continue coding, debugging and testing of AN/SLQ-32(V)2 operational program with Combat Direction System and LAMPS MK III. Complete performance acceptance. Test and deliver accepted program to FFG-7 Combat System Test Center. Initiate the development of computer programmed specifications and coding of Combat Direction System and LAMPS MK III related functions of AN/SLQ-32(V)3 integrated programs. S1085: Continue engineering on CG-16/26, CGN 38 class and DDG 993 upgrade to SM-2/New Threat Upgrade. Continue development of simulations for Integrated Combat System Test facility. Test bed validation and Combat Direction Systems and AN/SLQ-32 integration testing to be completed for the DD 963 class. S1591: Complete the development of Combat Direction System Computer program changes for the FY 1983 Digital Interface of specific weapons and sensor systems. Initiate or continue the development of Combat Direction System Computer Program changes for the FY 1984, 1985 and 1986 Digital Interface of specified Weapons and Sensor Systems.

4. (U) FY 1984 Planned Program: S0164: Continue coding, debugging and testing of AN/SLQ-32(V)2 operational program with Combat Direction System and LAMPS MK III and deliver test load to CG 47 Combat System Test Center. S1085: Continue Combat System Engineering activity previously initiated. Conduct CGN 38 integration testing at the Integrated Combat System Test Facility. Conduct of DD-963 testing for Anti-Submarine Warfare Combat System. S1591: Continue the development of Combat Direction System Computer programs modifications required to support planned Combat System Improvements. Initiate or continue the developments of Combat Direction System Computer Program changes for the FY 1985, 1986 and 1987 Digital Interface of specified Weapons and Sensor Systems.

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

6. (U) Milestones: Not applicable.

Project: S1591 Title: Combat System Interface
Program Element: 63582N Title: Combat System Integration
DOD Mission Area: 344 - Tactical Command and Control Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The increased threat mandates that new digital interfaces be developed to combat direction system for the automatic processing and transfer of data. This necessitates software product improvements to the Combat Direction System Computer Programs to service these interfaces and process the data received from the systems. In the past, this computer program product improvement has been funded through a variety of sources. Combat Direction System funding has been provided via new ship construction accounts, program manager research and development accounts and through SHIPALT 9050 Fleet Modernization Program (FMP) funds. As the need to digitally interface new and improved combat systems continues to expand, establishment of centralized funding and control of digital combat system interfaces becomes critical. In FY 1983 and follow on years, the Combat Systems Engineering Office will be provided funds to meet combat direction system to subsystem interface requirements. Program development agencies have retained subsystem to subsystem and subsystem to combat direction system funding responsibility, but the Combat Systems Engineering Office has been designated as the lead office to ensure interface control and coordination.

(U) RELATED ACTIVITIES: This program element performs Combat Direction System computer program improvements to digitally interface with subsystems developed under other PEs including: PE 25620N, ASW Combat System Integration; PE 25623N, Surface Ship Sonar Modernization; PE 63553N, Surface Anti-Submarine Warfare; PE 63609N, Surface Launched Munitions; PE 64352N, Surface Launched Weaponry Ship Systems; PE 64358N, Close-In Weapon System (PHALANX); PE 64361N, NATO SEASPARROW; PE 64508N, Radar Surveillance Equipment; PE 64518N, Combat Information Center Conversion; PE 64554N, Surface Electronic Warfare (Engineering); PE 64607N, Electro Optics Sensors Development; PE 64608N, Joint Army/Navy Semi-Active Laser Guided Projectile Engineering; PE 64652N, Gun Systems Improvement Program; and PE 64713N, Tactical Towed Array Sonar. PE 63582N performs technical evaluation of combat system design concepts developed under PE 63568N Combat System Architecture and PE 63519N Advanced Command Data Systems so that integration concepts developed under these efforts can be effectively applied to ship modernization.

(U) WORK PERFORMED BY: In-House: Fleet Combat Direction System Support Activity, Dam Neck, VA and San Diego, CA; Naval Tactical Data System (NTDS) Development and Evaluation Site, Mare Island, CA and Naval Sea Systems Command, Washington, DC and Puget Sound Naval Shipyard, Bremerton, WA; and Naval Ocean Systems Center, San Diego, CA.

Contractor: Sperry Univac, St. Paul, MN; Vitro, Silver Spring, MD; and others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In FY 1981 and prior Combat Direction System Interface Funding was provided via new ship construction accounts, Program Manager R&D accounts and through SHIPALT 9050 Fleet Modernization Program (FMP) funds augmented by an O&MN advance planning account maintained in the Naval Sea Systems Command.

Project: S1591 Title: Combat System Interface
Program Element: 63582N Title: Combat System Integration
DOD Mission Area: 344 - Tactical Command and Control Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: In FY 1982 Combat Direction System Interface funding is provided via new ship construction accounts, Program Manager R&D accounts and through SHIPALT 9050 Fleet Modernization Program (FMP) funds augmented by an O&MN advance planning account maintained in the Naval Sea Systems Command.

3. (U) FY 1983 Planned Program; Complete the development of Combat Direction System computer program changes for FY 1983 integration of AN/SPS-67 in CG 16/N25 Class and DDG 2/15 Class and MK 68 Gun Fire Control System in CG 27/N35 and DDG 37 Classes. Initiate or continue the development of Combat Direction System computer program changes for FY 1984 integration of AN/SPS-67 in DDG 37 Class, HARPOON in CGN-9 and SM-2 in CGN 38 Class. Initiate or continue the development of Computer Direction System computer program changes for FY 1985 integration of New Threat Upgrade (NTU) and SYS-CG in CG 27/N35 Class, Common Weapon Control System (CWCS)/TOMAHAWK, LAMPS III, Anti-Submarine Warfare Combat System (ASWCS) and AN/SLQ-32 in DD 963 Class; AN/SPS-49 Automatic Target Detection (ATD), AN/SLQ-32, SM-2, LAMPS III, and Anti-Submarine Warfare Combat System in DDG 993 Class; and MK 86/SEAFIRE SYS-1 Integrated Automatic Detection and Tracking (IADT) and AN/SLQ-32 in LHA 1 Class. Initiate the development of Combat Direction System computer program changes for FY 1986 integration of AN/SLQ-32 in DDG 2/15 Class, CGN-9, CG 26 and CGN 38 Class; and SYS-CG and New Threat Upgrade (NTU) in CG 26 and CGN 38 Class.

4. (U) FY 1984 Planned Program: Complete the development of Combat Direction System computer program changes for the FY 1984 integration of AN/SPS-67 in DDG 37 and SM-2 in CGN 38. Initiate or continue the development of Combat Direction System computer program changes for FY 1985 integration of AN/SPS-67, AN/SYS-CG (with Identification Friend-or-Foe (IFF)), and New Threat Upgrade in CG 27/N35; LAMPS III, Common Weapon Control System (CWCS)/TOMAHAWK, VLS, and AN/SLQ-32 in DD 963; LAMPS III, Anti-Submarine Warfare Combat System, SM-2, AN/SPS-49 Automatic Target Detection (ATD), and AN/SLQ-32 Electronic Warfare System in DDG 993; MK 86 Gun Fire Control System (GFCS)/SEAFIRE, AN/SYS-1 Integrated Automatic Detection and Tracking (IADT) and AN/SLQ-32 in LHA-1. Initiate or continue the development of Combat Direction System computer program changes for FY 1986 integration of New Threat Upgrade and AN/SYS-CG (with Identification Friend-or-Foe (IFF)) in CG 16/N25; New Threat Upgrade and AN/SYS-CG (with Identificaton Friend-or-Foe) and AN/SLQ-32 Electronic Warfare System (EWS) in CG 26; AN/SYS-CG (with Identification Friend-or-Foe (IFF)) and AN/SLQ-32 Electronic Warfare System (EWS) in DDG 2/15; AN/SLQ-32 in CGN-9; New Threat Upgrade, AN/SYS-CG (with Identification Friend-or-Foe (IFF)) and AN/SLQ-32 Electronic Warfare System (EWS) in CGN 38. Initiate or continue the development of Combat Direction System computer program changes for FY 1987 integration of Common Weapon Control System (CWCS)/TOMAHAWK in CGN 36, CGN 38; and AN/SLQ-17 Electronic Warfare System (EWS) in CV/CVNs.

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

6. (U) Milestones: Not applicable.

Project: S1591 Title: Combat System Interface
Program Element: 63582N Title: Combat System Integration
DOD Mission Area: 344 - Tactical Command and Control Budget Activity: 4 - Tactical Programs

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1591	Combat System Interface	*	**	8,243	10,775	Continuing	Continuing

* Funded from new ship construction accounts and Program Manager R&D Accounts and through SHIPALT 9050 Fleet Modernization Program funds augmented by an O&MN advance planning account maintained by the Naval Sea Systems Command.

** $7.1 million O&MN funding from SHIPALT 9050 in FY 1982.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63589N
Title: DDGX
DOD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	75,300	100,844	138,595	117,614	TBD	TBD
S1336	DDGX Ship Design*****	8,500	15,100	0	0	0	23,600
S1337	DDGX Combat System	26,800	55,756	138,595	117,614	TBD	TBD
S1449	Light Weight AEGIS	0	9,988	*	*	*	*
S1451	Light Weight Sonar	0	14,500	**	**	**	**
S1558	AEGIS Product Improvement (Advanced)	40,000	***	***	***	***	***
S1314	Electric Drive	0	5,500	****	****	****	****

* Program continues in PE 64307N CG-47/AEGIS Product Improvement, Project S1275 SPY-1 Radar Improvement.
** Program will continue in PE 64575N SQS-53C Sonar in FY 1983 and beyond. Project description contained in PE 64575N.
*** FY 1981 Congressional add-on to start SPY-1B radar development. Program continues in PE 64307N CG-47/AEGIS Product Improvement, Project S1275, SPY-1 Radar Improvement.
**** Program will continue in PE 63573N Electric Drive in FY 1983 and beyond. Project description contained in PE 63573N.
***** Ship contract design to be SCN funded in FY 1983 and beyond.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Perform Preliminary Ship Design phases and conduct engineering development for selected systems/subsystems for the new multi-mission guided-missile destroyer (DDGX). The combat suite for the DDGX will be designed to maximize the ship's Strike, Anti-Air, Anti-Surface and Anti-Submarine Warfare Capability. Intensive industry participation, competition and innovation in the ship and combat system design is planned. A critical need exists to develop and produce battle group capable surface combatants to maintain the Navy force level objective (about seventy-nine ships required by the year 2000). The CG-47 class will provide about twenty-four of these combatants. The DDGX (about 62 ships planned) will be less expensive and will complement, not replace, CG-47 Class cruisers. DDGX construction must start in FY 1985 to maintain the necessary force levels. The DDGX will operate as part of Battle Groups in high-threat areas, Surface Action Groups in lesser threat areas, Underway Replenishment Groups and Amphibious Warfare Groups.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete Preliminary design, conduct DSARC II and initiate Contract Design. Award ship system design support contracts to at least two shipbuilders. Continue with engineering development of selected systems/subsystems. Award contract for development of an Agile Beam Illuminator. Initiate procurement planning for long-lead

Program Element: 63589N
DOD Mission Area: 238 - Other Naval Warfare

Title: DDGX
Budget Activity: 4 - Tactical Programs

equipment for lead ship. The increase in funding between FY 1982 and FY 1983 ($37,751 thousand) is due to the engineering and technical development work that is required to support the completion of the ship and combat system contract design plus the engineering development of certain combat system elements such as the Combat Direction System, Anti-Surface Warfare System and the Agile Beam Illuminator, and the preparation of design specifications for the computer programs. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: FY 1981: In Project S1336 DDGX Ship Design and Project S1337 DDGX Combat System, decreases of $11,785 and $2,987 are a result of Navy application of an undistributed Congressional reduction in the FY 1981. In Project S1558 AEGIS Product Improvement, the increase of 374 reflects adjustments for inflation. FY 1982: Projects S1448 Non-AEGIS Radar Development and S1450 Combat System Integration were reduced by 20,000 each and these efforts were transferred to Project S1337 DDGX Combat System to better reflect program requirements. Project S1336 DDGX Design was reduced by 15,900 which was transferred to Project S1337 DDGX Combat System to reflect current requirements. Project S1451 Light Weight Sonar was reduced by 25,500 by Congressional direction. Project S1314 Electric Drive was added by Congress, and 5,500 was included for this effort. To reflect minor inflation reductions of 156, Projects S1337 DDGX Combat System (144) and S1449 Light Weight AEGIS (12) were decreased. FY 1983: The specific performance and engineering goals of the DDGX program were defined, resulting in a requirement of 138,595 in Project S1337.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	89,698	121,000	TBD	TBD	TBD
S1336	DDGX Ship Design	0	20,285	31,000	TBD	TBD	TBD
S1337	DDGX Combat System	0	29,787	29,000	*	TBD	TBD
S1448	Non-AEGIS Radar Development	0	0	20,000	TBD	TBD	TBD
S1449	Light Weight AEGIS	0	0	10,000	TBD	TBD	TBD
S1450	Combat System Integration	0	0	20,000	TBD	TBD	TBD
S1451	Light Weight Sonar	0	0	40,000	TBD	TBD	TBD
S1558	AEGIS Product Improvement	0	39,626	**	**	**	**

* Becomes Project S1450, Combat System Integration in FY 1982 and beyond.
** Program will continue in FY 1982-1985 under P.E. 64303N Area Air Defense, Project S1275 SPY-1 Radar Improvement (FY 1981 Congressional Add-on).

(U) OTHER APPROPRIATIONS FUNDS: To be determined.

Program Element: 63589N
Title: DDGX
DOD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The inventory of battle group capable surface combatants (cruisers and destroyers) is currently below required strength and will continue to decrease as older ships are retired. The multi-mission guided missile destroyer (DDGX) is a new design with lead ship authorization for FY 1985. Project S1336 DDGX Ship Design funds the ship Preliminary Design. During this phase alternative(s) chosen from the Concept Design Phase are developed and further refined to establish top level specifications which uniquely define performance characteristics, including the combat system, and which provide the basis for budgetary quality estimates of ship acquisition costs. This program element also includes planning for the Contract Design Phase which will be funded with ship construction funding. Project S1337 DDGX Combat System provides the engineering necessary to develop the DDGX Combat System encompassing Strike, Anti-Air, Anti-Surface and Anti-Submarine Warfare components. Combat System engineering of these systems will provide an effective balanced multi-warfare combat system. Project S1449, the Lightweight AEGIS program, builds upon the AEGIS SPY-1 radar improvements which are planned upgrades to later ships of the CG-47 class. The SPY-1 improvement program develops a series of enhancements which will lead to a lighter, less costly radar and will take full advantage of phased array capabilities. This project along with PE 64307N, Project S1275, SPY-1 Radar Improvement, develops the improved SPY-1 radar which will be adapted to the DDGX Combat System application. Project S1451, the Lightweight Sonar Improvement Program will provide an improved SQS-53 sonar with increased performance, operability, reliability and maintainability, allow reduced manning, require less space and weight and permit effective integration with new acoustic sensors and command and control systems. The program will continue in FY 1983 and beyond under PE 64575N, AN/SQS-53. Project S1314 Electric Drive provides for the beginning of advanced development of electric drive which will provide substantial weight and life-cycle propulsion cost savings in gas turbine propelled ships.

(U) RELATED ACTIVITIES: Combat System Architecture, PE 63568N; Combat System Integration, PE 63582N; Ship Concept Fomulation, PE 63564N; AEGIS, PE 64303N; Surface Ship Sonar Modernization, PE 25623N; ASW Combat System Integration, PE 25620N; Advanced Surface Sonar, PE 63553N; Shipboard Propulsion System Advanced, PE 63508N; Electric Drive, PE 63573N; AN/SQS-53C, PE 64575N; PE 64307N SPY-1B Radar.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ships Weapons Systems Engineering Station, Port Hueneme, CA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Surface Weapons Center, Dahlgren, VA; Naval Underwater Systems Center, New London, CT. Contractors: Applied Physics Laboratory/Johns Hopkins University, Silver Spring, MD. RCA, Moorestown, NJ; General Electric, Syracuse, NY. Others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed ship and combat system concept design. Developed the acquisition strategy and received DSARC Milestone I approval. Commenced preliminary design and awarded the Combat System Engineering Agent contract. Initiated program planning for engineering development of selected systems/subsystems. Conducted the second industrial briefing.

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DOD Mission Area: 238 - Other Naval Warfare

Title: DDGX
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue ship and combat system preliminary design (Projects S1336 and 1337) with emphasis on developing drawings and specifications for the formal ship design baseline. Conduct engineering development of the combat system and initiate development of combat direction systems and weapon control computer programs. Develop computer program performance specifications. Procure equipment for selected systems/subsystems to support land-based engineering facility design and development activities. Initiate planning for DSARC Milestone II. Project S1449 Light Weight AEGIS will support development of the SPY-1B radar, a derivative of which will be used in DDGX. This project is funded under a separate Program Element PE 64307N SPY-1B Radar in FY 1983 and beyond. Project S1451 Light Weight Sonar provides funding for the development of the lightweight, improved AN/SQS-53C sonar which is funded in a separate program, PE 64575N AN/SQS-53C in FY 1983 and beyond. Project S1314 Electric Drive begins development of a full scale electric drive propulsion system which is a candidate for follow on ships of the DDGX Class. This Project is transferred to PE 63573N Electric Drive in FY 1983 and beyond.

3. (U) FY 1983 Planned Program: Complete Preliminary Design, conduct DSARC II and initiate Contract Design. Award ship systems design support contracts to at least two shipbuilders. Continue with engineering development of selected systems/subsystems. Initiate procurement planning for long-lead equipment for the lead ship. Award contract for development of Agile Beam Illuminator.

4. (U) FY 1984 Planned Program: Complete DDGX lead ship contract design. Initiate detail design and long-lead procurement for the lead ship. Continue with engineering development of selected system/subsystems. Solicit a proposal for construction of lead ship. Continue development of Agile Beam Illuminator.

5. (U) Program to Completion: Develop the DDGX lead ship detail design. Complete engineering development of selected systems/subsystems. Award lead ship. Develop the follow ship contract design. Award follow ship contracts. Complete Agile Beam Illuminator Development. Complete Engineering Improvements under other Program Elements to be incorporated into DDGX.

6. (U) Milestones:

Milestone	Date
1. Complete Concept Design	December 1980
2. Complete Preliminary Design	January 1983
3. Complete Contract Design	February 1984
4. Award Lead Ship Detail Design & Construction Contract	January 1985
5. Ship Delivery	1989

Project: S1336
S1337
Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX Combat System
Title: DDGX
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA

1. (U) Development Test and Evaluation : There has been no Development Test and Evaluation performed thus far by or for the DDGX Program. However, there has been some related testing performed by other programs for equipments currently under development and planned for installation on the DDGX. Details concerning Development Test and Evaluation efforts of related test programs may be found in their respective Program Element Descriptive Summaries. Developmental Test-IA will be conducted during Preliminary Design. The test article will consist of a Propulsion model, fully appended with shafts, struts and shaft fairings, rudder(s), and bilge keels. The Development Test and Evaluation Objective will be to determine that the DDGX meets the design requirements for powering, seakeeping and maneuvering. The model test program will commence early in the Preliminary Design and continue to the end of Preliminary Design. Tests will be conducted for powering, seakeeping, maneuvering, and stack gas flow. No combat system level DDGX Development Test and Evaluation efforts are planned during the Preliminary Design Phase. T&E activities will principally support planning, site selection equipment procurement and preparation of a combat system Land Based Engineering Facility. Monitoring and coordination of T&E for ongoing development programs will continue to ensure proper time phasing of DDGX Developmental Test-II requirements.

(U) During the Developmental Test-II Test Phase (Jan 83 - Mar 87) planning for Ship Systems Test Facility will be initiated. This facility will support the lead DDGX and will test changes from a DD-963 propulsion configuration. The primary objective will be to test equipment/systems which differ from the basic DD-963 configuration at a shore test facility rather than on board ship. The Combat System Land Based Engineering Facility being considered will represent, through a mix of equipment and simulations, a full-up operational prototype replicating the planned sensor information processing and weapon system installations aboard the DDGX. It will be used for development, integration and test activities, and support the development, integration and testing of the combat system to assure that:

(a) The system functions in accordance with the Surface Combat System Operational Philosophy.
(b) Performance objectives for each warfare area are achieved under projected adverse environmental conditions.
(c) The system availability and maintainabilty requirements are satisfied and can be achieved with DDGX manpower and skill levels.
(d) External and internal information transfer systems enable effective use of the DDGX under a wide range of casualty or battle situations.

NOTE: To support the propulsion energy efficiency upgrade program, a Ship Systems Land Based Engineering Facility will be established at a later date under another Program Element.

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Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX Combat System
Title: DDGX
Budget Activity: 4 - Tactical Programs

(U) In order to better prepare for Operational Test-III testing, additional Developmental Test-III testing may be considered as follows:

(a) At-Sea weapon firings from lead DDGX,
(b) Weapon firings from surrogate ships, and/or
(c) Ships service generator reliability tests.

Test data will be collected and analyzed to verify satisfaction of reliability, maintainability and availability requirements.

2. (U) Operational Test and Evaluation : There has been no DDGX Operational Test and Evaluation to date.

a. Initial Operational Test and Evaluation (IOT&E), is not conducted on standard displacement hull ships. To minimize the possibility of production deficiencies, factory and production acceptance testing and Land Based Engineering Facility testing will be monitored to provide an assessment of operational effectiveness and operational suitability during the production of the lead ship. This monitoring of subsystems is considered IOT&E and listed below accordingly. Also during the IOT&E period, COMOPTEVFOR will review required survivability/vulnerability models as well as all documents essential to an orderly introduction of DDGX into the active fleet.

(1) Operational Test-IIA (Feb 83 - Mar 86)

(a) Equipment Description - A full-up operational prototype Combat System Land Based Engineering Facility which replicates planned installation aboard DDGX.

(b) Operational Test Objective - To provide an assessment and confidence that the propulsion configuration changes will be operationally suitable and effective.

(c) Operational Test Events/Scope of Testing/Basic Scenarios - COMOPTEVFOR will witness scheduled developmental tests and will participate in scheduled design and mock-up reviews as necessary. Operator and maintenance personnel of the type and skill levels specified to man DDGX in the fleet will additionally conduct system operational tests and maintainability demonstrations at the test facility.

NOTE: COMOPTEVFOR will support operational testing at a Ship Systems Land Based Engineering Facility in support of the propulsion energy efficiency upgrade program established under another Program Element.

Project: S1336
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Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX Combat System
Title: DDGX
Budget Activity: 4 - Tactical Programs

(2) Operational Test-IIB (Jun 83 - TBD)

(a) Equipment Description - A Ship Systems Test Facility which will test changes from a DD-963 propulsion configuration.

(b) Operational Test Objective - To provide assurance that the combat system components (equipment, computer programs, physical arrangement, communications, etc.) singularly and as an integrated system are, or have the potential to be, operationally effective and operationally suitable.

(c) Operational Test and Evaluation Events/Scope of Testing/Basic Scenarios - COMOPTEVFOR will witness scheduled developmental tests and will participate in scheduled design and mock-up reviews as necessary. Operator and maintenance personnel of the type and skill level specified to man DDGX in the fleet will additionally conduct system operational test and maintainability demonstrations. Specific OT&E requirements will be determined when DDGX combat system components have been fully identified.

b. Follow-on Test and Evaluation

(1) Operational Test III (Dates To Be Determined)

(a) Equipment Description - DDGX

(b) Operational Test and Evaluation Objectives - To determine or assess:

1 The operational effectiveness and operational suitability of those individual combat systems (including weapons systems) and ship systems (and elements thereof) that have not previously undergone Operational Test and Evaluation at sea in a comparable operational configuration.

2 The capability of DDGX to effectively conduct both single and simultaneous Anti-Air, Anti-Submarine, Anti-Surface, and Strike Warfare operations.

3 Mobility system performance, sea-keeping and ship support system (e.g., auxiliary and main propulsion, electrical interfaces, habitability, damage prevention and control) capabilities.

4 As a result of physical inspections and resultant qualitative analyses, survivability and vulnerability at sea.

(c) Operational Test and Evaluation Events/Scope of Testing/Basic Scenarios - Following Combat System Ship Qualification and Trials and prior to Post Shakedown Availability , DDGX will be required in a fully operable condition for a period of about 45 days for accomplishment of the following tasks:

1 TASK ALFA will test, through firings at sea on appropriate test ranges, the performance of DDGX weapons systems that have not previously undergone Operational Test and Evaluation at sea in a comparable operational configuration.

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Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX Combat System
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2 TASK BRAVO will test DDGX Integrated Combat System warfare capabilities while operating in company with (and against) other Navy units in missions involving concurrent Anti-Air, Anti-Submarine, Anti-Surface, Strike Warfare and Command, Control and Communications problems.

3 TASK CHARLIE will evaluate DDGX mobility and support system performance under various conditions of battle group and independent operations in a full range of environmental extremes in both restricted and unrestricted waters.

4 TASK DELTA will evaluate all DDGX systems designed for operations with other Navy units and off-ship support systems (e.g., navigation, communications, data links).

NOTE: The above tasks are listed in no particular order and may in many instances be conducted concurrently.

(2) Operational Test-IV (Dates To Be Determined)

(a) Equipment Description - DDGX

(b) Operational Test and Evaluation Objectives

1 To verify the operational effectiveness and operational suitability of all system additions and modifications made during and subsequent to Post Shakedown Availability.

2 To verify the adequacy of corrective action taken on all deficiencies noted during Operational Test-III.

3 To assess ship manning and training requirements.

(c) Operational Test and Evaluation Events/Scope of Testing/Basic Scenarios - DDGX will be tested during independent and battle group multi-threat, multi-warfare operations. Duration of testing will be dependent upon results of Operational Test-III testing.

c. Data Collection and Analyses and Corrective Action Program - A Data Collection and Analyses and Correction Action Program will be conducted during operational testing and will be defined in the appropriate OT Test Plans.

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Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX Combat System
Title: DDGX
Budget Activity: 4 - Tactical Programs

3. (U) System Characteristics (Goals)*

Characteristics	Unit of Measure	Objective	Demonstrated Performance
Length between perpendiculars	m		TBD
Beam (at waterline)	m		TBD
Draft at full load displacement	m		TBD
Full load displacement maximum	metric tons		TBD
Accommodations (based on 110% of complement for Officers, CPO's, and Crew)	Officers		
	CPO's		
	Enlisted		
	Total		TBD
Speed (max)	kts		TBD
Range	NM		TBD
Stores	days		TBD
			TBD
Propulsion			
Reliability			TBD
Maintainability			TBD
Mission Availability			TBD
Probability of Being Available times Mission Reliability			TBD

* Extracted from Top Level Requirements (DRAFT) of 30 June 1981 or Test and Evaluation Master Plan No. 801 of 19 February 1981. This data is provided for information purposes. It is considered representative but is subject to change as the ship design matures.

Project: S1336
Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Guided Missile Destroyer (DDGX) is a new design with lead ship originally scheduled to be contracted in FY 1985 and to deliver in FY 1989. This project funds Concept and Preliminary Design Phases. During the Preliminary Design phase alternative(s) chosen from the Concept Design Phase are developed and further refined to establish top level specifications which uniquely define performance characteristics, including payload, and which provide the basis for establishing budgetary quality estimates of ship acquisition costs. Selected components of the main propulsion and auxiliary plant for DDGX will receive extensive testing at a Land-Based Engineering Facility. Shipbuilder participation will be encouraged and is planned during each design phase to enhance innovation in the establishment of the design baseline and ship configuration.

(U) RELATED ACTIVITIES: Ship Concept Formulation, PE 63564N; Ship Systems Engineering Standards, PE 63532N; Ship Propulsion Systems (Advanced) PE 63508N; Electric Drive, PE 63573N.

(U) WORK PERFORMED BY: In-House: Naval Ships Systems Engineering Center, Philadelphia, PA; Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; David Taylor Naval Research and Development Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed ship concept design, and developed acquisition strategy and programmatic documentation to support DSARC Milestone I approval. System engineering agent selected and brought under contract. Initiated planning to support a propulsion land-based engineering facility and propulsion upgrades.

2. (U) FY 1982 Program: Continue preliminary design with emphasis on developing drawings and specifications for the formal ship design baseline. Conduct systems engineering and integration of the design of hull, machinery, and combat system components. Involve potential shipbuilders in producibility-related studies. Procure equipment for the propulsion Land Based Engineering Facility (to be funded in other Program Elements). Commence procurement actions to competitively select shipbuilders who will assist in contract design through their Ship Systems Design support contracts.

3. (U) FY 1983 Planned Program: Complete preliminary design and initiate contract design (under SCN). Continue with engineering development of the propulsion system and efficiency upgrades under other program elements.

4. (U) FY 1984 Planned Program: Not applicable. Contract design funded under SCN funding.

Project: S1336
Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: DDGX Ship Design
Title: DDGX
Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1336	DDGX Ship Design*	8,500	15,100	0	0	0	23,600

* Ship contract design to be funded under SCN in FY 1983 and beyond.

Project: S1337 | Title: DDGX Combat System
Program Element: 63589N | Title: DDGX
DoD Mission Area: 238 - Other Naval Warfare | Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides the engineering required to develop the DDGX combat system. This combat system will encompass the mission areas of Strike, Anti-Air, Anti-Surface, and Anti-Submarine Warfare giving DDGX the capability to supplement the CG-47 Class ships in a high threat environment or operate independently in areas of lower threat. In addition, this program develops elements of the Strike, Anti-Air, Anti-Submarine and Surface weapon and fire-control systems permitting a balanced and effective multi-warfare combat system.

(U) RELATED ACTIVITIES: Combat System Architecture, PE 63568N; Combat System Integration, PE 63582N.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI. Contractors: Applied Physics Laboratory/Johns Hopkins University, Silver Spring, MD; RCA, Moorestown, NJ; G.E., Syracuse, NY; Others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Initial combat system studies were completed. Also, alternative combat system configurations were studied to support the ship concept design baseline. Competitive procurement led to the selection of RCA, Moorestown, NJ, as the Combat System Engineering Agent to perform combat system engineering and design. Early work in Phase I of the Combat System Engineering effort supported initial ship Preliminary Design studies.

2. (U) FY 1982 Program: Initiate Full Scale Engineering Development of warfare area systems. Initiate development of combat direction systems and interface design specifications. Select a Land-Based Engineering Facility and procure long-lead equipment for this facility. Conduct combat system level Preliminary Design Review. Initiate design of the DDGX configuration of the improved SPY-1 derivative radar.

3. (U) FY 1983 Planned Program: Continue Engineering Development of warfare area systems. Computer program performance specifications will be completed. Combat System Level Critical Design Review will be conducted. Complete procurement of Land-Based Engineering Facility equipment. Begin Phase II (Design Engineering) of Combat System Engineering Agent contract. Begin development of the Agile Beam Illuminator for the follow ships.

4. (U) FY 1984 Planned Program: Continue hardware and software development of combat system elements. Complete Phase I (System Definition) of Combat System Engineering Agent contract. Begin outfitting the land-based engineering facility. Develop system plans and equipment to support combat system-level test requirements.

Project: S1337 Title: DDGX Combat System
Program Element: 63589N Title: DDGX
DoD Mission Area: 238 - Other Naval Warfare Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Complete the installation of the combat system and equipment at the Land Based Engineering Facility. Conduct element, warfare area, combat system and special function tests to identify and resolve configuration element and system level problems. Demonstrate total combat configuration system engineering and integration of effectiveness.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1337	DDGX Combat System	26,800	55,756	138,595	117,614	TBD	TBD

Project: S1449
Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: Lightweight AEGIS
Title: DDGX
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Lightweight AEGIS program builds upon the AEGIS SPY-1 radar improvements which are planned upgrades to future CG-47 Class ships. The SPY-1 improvement program develops a series of enhancements which will lead to a lighter, less-costly radar that will take full advantage of phased array capabilities. This project contributes to that improved SPY-1B Anti-Air radar for use in future CG-47 Class ships. This SPY-1B is the basis for the development of a derivative radar for DDGX, SPY-1D, which will be developed under Project S1337 DDGX Combat System. In FY 1983 and beyond, the SPY-1B development will be completed in PE 64307N, Project S1275 SPY-1B Radar Improvement.

(U) RELATED ACTIVITES: 64303N, AEGIS; PE 64375N, SPY-1 Radar Improvement.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ships Weapons Systems Engineering Station, Port Hueneme, CA. Contractors: Applied Physics Laboratory/John Hopkins University, Silver Spring, MD; others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Not applicable.

2. (U) FY 1982 Program: Support advanced engineering development to adapt a SPY-1 derivative radar to a configuration applicable to the DDGX combat system. This effort builds on the AEGIS product improvement effort associated with the CG-47 Class which will produce a lighter, less-costly and more-capable radar as an option for the DDGX AAW radar design. FY 1983 and beyond funded under PE 64307N CG-47/AEGIS Product Improvement, Project S1275, SPY-1 Radar Improvement.

3. (U) FY 1983 Planned Program: Not applicable.

4. (U) FY 1984 Planned Program: Not applicable.

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

6. (U) Milestones: Not applicable.

Project: S1449
Program Element: 63589N
DoD Mission Area: 238 - Other Naval Warfare

Title: Lightweight AEGIS
Title: DDGX
Budget Activity: 4 - Tactical Programs

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1449	Lightweight AEGIS	0	9,988	*	*	*	*

* Program will continue in FY 1983 and beyond under PE 64307N CG-47/AEGIS Product Improvement, Project S1275, SPY-1 Radar Improvements.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63590N
Title: Wide Aperture Array (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	23,614	14,707	37,847	160,414 1/
S0222	Wide Aperture Array (Advanced)	(14,493)1/	(23,513)1/	23,614	14,707	37,847	160,414 1/
	(Quantity - Wide Aperture Array Advanced Development Model) 2/						(1)2/

1/ FY 1982 and prior-year funding for Wide Aperture Array is contained in Program Element 63504N, Submarine Sonar Development (Advanced). FY 1981 and 1982 estimates shown reflect the Wide Aperture Array sub-task amounts in Project S0222 in Program Element 63504N.
2/ Development/Operational Test and Evaluation; procured prior to FY 1981 under Program Element 63504N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element completes the development and testing of a Wide Aperture Array advanced development model for potential application in SSN 688 class and later design submarines. FY 1982 and prior funding for this project is contained in Program Element 63504N (Submarine Sonar Developments (Advanced)).

(U) BASIS FOR FY 1983 RDT&E REQUEST: Ongoing effort for the advanced development of the arrays and electronics will continue in FY 1983. Factory acceptance testing of the electronics will continue. The design effort for the installation of the advanced development model on the sea test platform will be completed. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) Although this Program Element did not exist in the FY 1982 submission, it is a continuation of funding contained in Program Element 63504N, under the same project number. Refer to the corresponding Descriptive Summary for changes in FY 1981 and FY 1982 funding. With respect to the FY 1982 Descriptive Summary for Program Element 63504N, the FY 1983 estimate for the Wide Aperture Array sub-task has increased by 996 due to revision of development estimates. The total estimated cost of the Wide Aperture Array advanced development program has increased by 39,402 due to a one year slip in the milestone II date and addition of a detection capability.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Reflected in the Descriptive Summary for Program Element 63504N in FY 1982 as a sub-task under Project S0222.

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11,840	12,006	20,299	22,618	19,849	121,012
S0222	Wide Aperture Array	11,840	12,006	20,299	22,618	19,849	121,012

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0222 (Rapid Passive Localization Sonar): Operational Requirement AS55, contains the applicable requirements. This project will develop a Wide Aperture Array sonar system for potential installation on SSN 688 and later design attack submarines. The Wide Aperture Array will provide more accurate rapid passive ranging and, tracking to support accurate delivery of the MK-48 torpedo and tactical cruise missiles against a maneuvering target. Present fire control systems utilizing passive data require to generate a solution against an assumed non-maneuvering target. The Wide Aperture Array will also provide of either torpedo or threat platforms. The Wide Aperture Array will be capable of integration into the AN/BQQ-5 sonar or with a future combat system. The Wide Aperture Array has been restructured from an advanced development model integrated into the AN/BQQ-5 sonar to a stand-alone advanced development model to evaluate the external conformal array technology and associated ranging performance. One array (7 x 13 feet) and system electronics will be tested at Lake Seneca. Advanced development model electronics and six 7 x 13 feet arrays will be procured for development test/operational test Phase I sea testing.

(U) RELATED ACTIVITIES: Full scale engineering development of the Wide Aperture Array will be conducted in Program Element 64520N (Wide Aperture Array (Engineering)). Low-cost software (Low Ship Impact) techniques responding to Operational Requirement AS-55 are developed in the Attack Submarine Combat Control Systems Improvement (Advanced) program, project S1686 of Program Element 63562N. FY 1982 and prior funding for this project is contained in Program Element 63504N (Submarine Sonar Development (Advanced).

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT (lead laboratory); Naval Ocean Systems Center, San Diego, CA; Naval Weapons Support Center, Crane, IN; and Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractors: EG&G Washington Analytical Services Center, Rockville, MD; RADIAN, Inc., Austin, TX; H. I. Thomas Corporation, Gardena, CA; General Dynamics, Electric Boat Division, Groton, CT; Brunswick Corp., Costa Mesa, CA; Raytheon, Submarine Signal Division, Portsmouth, RI; General Electric Co., Syracuse, NY; International Business Machines, Manassas, VA; Bolt, Beranek and Newman, Cambridge, MA; Analysis and Technology, No. Stonington, CT; Brunswick Corp., Costa Mesa, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Program initiated August 1971 and a separate project established in FY 1975 under the name "Rapid Acoustic Passive Localization". Defense System Acquisition Review Council Milestone I equivalent (Chief of Naval Operations Executive Review Board) held December 1972. Authorization was granted to proceed into advanced development. Cost effectiveness/tradeoff analysis of Rapid Passive Localization approaches were completed. Sea tests of an experimental Wide Aperture Array on USS HADDOCK January through March 1974 and June 1976 demonstrated effective baffling for inboard arrays and effective targeting for the MK 48 torpedo. Approval was given in October 1976 to develop a foot inboard array system. Program restructured to development of external conformal arrays, July 1977 due to cancellation of plans for an SSN 688 long hull. Partially populated external array tested at Lake Seneca, May 1977. Flow noise tests on KAMLOOPS conducted October 1978 through April 1979 demonstrated array design met flow noise goal

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

array tests on SSN 688 hull simulator at Lake Seneca June 1978-February 1979 showed designs met vibration noise goals and established a baseline array configuration. A bid package was developed for competitive procurement of the arrays. A contract to fabricate lake test electronics for test with a 7 foot x 13 foot array was let. A 7 foot x 13 foot array and hull penetrator were shock tested on the Submarine Shock Test Vehicle. A graphite compliant tube baffle was developed as an alternative to steel which could reduce six array system weight by five (5) long tons but is 6 times the cost of steel baffles and consequently will not be used. A sea test was conducted on USS BARB (SSN 596) during January - April 1980 (3 phases) using a modified Royal Australian Navy electronics package to provide assessment of Wide Aperture Array performance tactics development and to obtain a data base to use for development of related target motion analysis techniques. A contract was awarded to Raytheon for one set of advanced development model sea test electronics. A contract was awarded to Brunswick Corp. March 1981 for 7 x 13 foot arrays to be used at Lake Seneca and on the Sea Test Platform. A contract was awarded to H. I. Thomas Corporation in August 1981 for compliant tube baffles to be used at Lake Seneca and on sea test platform. Factory Acceptance Test of Lake Seneca electronics and analysis of USS BARB modified Royal Australian Navy electronics sea test performance completed July 1981. The Department of Defense has agreed that the program should be managed by the Navy, and the Secretary of the Navy has approved the program's Navy Decision Coordination Paper. Test and Evaluation Master Plan 048-1 was approved and promulgated on 11 June 1980. Program was funded in Program Element 63504N in FY 1981 and prior years.

2. (U) FY 1982 Program: Perform shock test on production compliant tube baffle segments and hydrophone assemblies. Continue development of Advanced Development Model sea test electronics. Install 7 foot x 13 foot dummy array on Complete lake test. Commence installation design at shipyard. FY 1982 funding is contained in Program Element 63504N.

3. (U) FY 1983 Planned Program: (Initial year of funding in this element). Continue to monitor submarine for long duration array survivability tests. Conduct factory acceptance test of Advanced Development Model sea test electronics. Complete development of target motion analysis module designs.

4. (U) FY 1984 Planned Program: Continue to monitor dummy array condition for survivability test of 637 class submarine. Deliver Advanced Development Model electronics to shipyard. Deliver 7 x 13 foot arrays to shipyard. Install submarine for Development/Operational Test I.

5. (U) Program to Completion: The advanced development model Wide Aperture Array will complete Development/Operational Test I in FY 1985 with Department of the Navy Systems Acquisition Review Council Milestone II review. Full scale development will follow under program element 64520N, Wide Aperture Array (Engineering), a planned FY 1985 new start.

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	Milestones		Date
1.	Complete Wide Aperture Array Flow Noise Tests		Apr 79
2.	Let Wide Aperture Array Lake Test Electronics Contract		Jul 79
3.	Complete AN/BQG-Royal Australian Navy Sea Test		Apr 80
4.	Complete Array Shock Tests (Includes Hull Penetrators)		Sep 80
5.	Award Wide Aperture Array Advanced Development Model Electronic Contract		Sep 80
6.	Award Contract for seven 7 foot x 13 foot Arrays	(Feb 81)*	Mar 81
7.	Procure Skirt Baffles, Array Fairings & Compliant Tube Baffles	(May 81)*	Aug 81
8.	Shock Test Production Compliant Tube Baffle & Array Hydrophone Assemblies	(Jul 81)*	Mar 82
9.	Start Array Survivability Test		Dec 81
10.	Complete Lake Seneca Array/Electronic Test	(Apr 82)*	Sep 82
11.	Deliver Components and Install Array and Electronics for Sea Test (Includes Baffles)		
12.	Complete Wide Aperture Array Sea Test		
13.	Department of the Navy Systems Acquisition Review Council Milestone II		

*Dates shown in FY 1982 Descriptive Summary. Slip of shock test (8) and Lake Seneca array/electronics test (10) due to procurement delays for arrays (7) and compliant tube baffle (8). Milestone 13 reflects Navy, rather than Department of Defense, decision authority.

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

(a) Wide Aperture Array Testing: Tests on the USS BAYA (FY 1971) indicated that Wide Aperture Array [ ] is feasible. Self noise evaluation on USS HADDOCK (FY 1974) demonstrated that self noise on a nuclear submarine could be baffled to allow satisfactory operation. Component testing for reliability and maintainability is being pursued concurrent with the development. Results from the Seneca Lake test series (FY 1976 - FY 1977) using a [ ] external Wide Aperture Array configuration mounted on an SSN 688 hull simulator indicated array noise levels [ ] are achievable over most of the operating band [ ] Flow noise tests on KAMLOOPS at Lake Pend Orielle, October 1978 - April 1979, demonstrated that the array design met the flow noise goal of [ ] Full [ ] array tests on a SSN 688 hull simulator at Lake Seneca, June 1978 - February 1979, proved that the array met the hull-borne and vibration noise goals. As a result of the above testing a baseline array design was established, and a bid package developed for competitive procurement of the arrays. A sea test was conducted on USS BARB, January - April 1980 (3 phases), using a modified Royal Australian Navy electronics package to provide an assessment of Wide Aperture Array performance and tactics development, to obtain a data base to use for development of related target motion analysis techniques and to provide data for laboratory Wide Aperture Array performance evaluation. A 7 x 13 foot external conformal array and hull penetrator were shock tested on the Submarine Shock Test Vehicle (September 1980). Laboratory and lake tests have been completed on a graphite compliant tube baffle design during FY 1980 and achieved equivalent acoustic performance to the steel tube designs. This design could reduce system weight by five (5) long tons. Six steel baffles and one graphite baffle have been procured for full scale sea testing.

(b) Low Ship Impact Ranging Testing: [ ] This was demonstrated during three sea test periods (FY 1974, 1975 and 1976) on USS CAVALLA using AN/BQS-13 and AN/BQH-4 arrays. [ ] ranging using [ ] targets achieved ranges [ ] The towed array [ ] model made possible algorithm operation shortly after an own-ship maneuver. A final test (before incorporation into the AN/BQQ-5B sonar) was accomplished in November 1979. International Business Machines is now developing the engineering change and software specifications.

(c) [ ] This was demonstrated on USS CAVALLA using the AN/BQS-13 sonar system at ranges [ ] targets; tested on USS PUFFER (November 1979); and subsequently incorporated into the MK 117 fire control systems.

(d) [. Ranging: This was demonstrated on USS DOLPHIN during sea tests (FY 1977 - FY 1978). Data generated at various ranges demonstrated that the [ ] correlation required to support this ranging could be attained. The potential range and depth accuracy of the algorithm has been demonstrated by this data. Testing required to determine environmental and instrumentation limitations in exploiting this technique was initiated in October 1979, culminating in a sea test on USS DOLPHIN in August 1980.

2. (U) Operational Test and Evaluation:

(a) (U) Wide Aperture Array:

(1) (U) Operational Test and Evaluation to Date:

a. The basic principles of wave-front curvature ranging for torpedo targeting were demonstrated in 1967 during the AN/BQG-2A Operational Evaluation. As a result of reliability/maintainability and operational deficiencies observed, field changes were accomplished to upgrade to AN/BQG-2B, which was approved for service use in 1971. The underlying concept for the Wide Aperture Array is derived from the AN/BQG-2B.

b. In 1974, development electronics were interfaced with the AN/BQG-2B arrays installed in USS HADDOCK (SSN 621) for Development/ Operational Test and Evaluation. A conclusive assessment of operational effectiveness was not possible because onboard computer interface problems precluded a demonstration of real time ranging. Post-test laboratory demonstrations were conducted, using data recorded during the at-sea test.

c. In March - April 1980, two weeks of testing was conducted, utilizing the AN/BQG-2B arrays in USS BARB (SSN 596) and a modified Royal Australian Navy system. The degree of similarity between the Royal Australian Navy systems with the AN/BQG-2B arrays and the Wide Aperture Array is sufficient to allow earlier Operational Test and Evaluation than could have been accomplished with developmental Wide Aperture Array Systems. The test results were reported in July 1981. Results indicate the Wide Aperture Array as demonstrated by the Royal Australian Navy System has the potential to be operationally effective against current surface and submarine threats at MK 48 Torpedo ranges. The Royal Australian Navy System, using wavefront curvature, [ ] was demonstrated by the accuracy of the Royal Australian Navy Ekeland range solutions. It is recommended that there be continued development of the Wide Aperture Array Advanced Development Model.

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

(2) (U) Future Operational Test and Evaluation: Initial operational test and evaluation of an advanced development model Wide Aperture Array is currently scheduled for FY 1983. Results of this testing will support a decision regarding full-scale development. Specific objectives are to estimate the projected operational effectiveness and operational suitability of the Wide Aperture Array System. The system to be tested will consist of six external Wide Aperture Array subarrays and a stand-alone inboard electronics package, installed aboard a SSN 688 class submarine.

(b) (U) Low Ship Impact Ranging:

(1) (U) Operational Test and Evaluation to date. One week of Operational Test IA testing of [improvements was conducted in October - November 1979. Developmental software with stand-alone data processing equipment was installed in USS PUFFER (SSN 652). Testing consisted of semi-controlled geometries both on an instrumented tracking range and open ocean. Test objectives were to assess the potential operational effectiveness and operational suitability of the Low Ship Impact techniques and their readiness for integration into the AN/BQQ-5 sonar and/or MK-117 Fire Control Systems, as appropriate. The test results were reported in November 1980. Results indicate [improvements have the potential to improve the conduct of passive ranging and target motion analysis. It is recommended that there be continued development and testing of these three Low Ship Impact ranging techniques.

(2) (U) Future Operational Test and Evaluation. Operational Test and Evaluation will be conducted on the International Business Machines developed [engineering change and the Naval Underwater Systems Center New London [algorithm at laboratory test sites in FY 1982. Operational Test and Evaluation will be continued through FY 1983 as additional Low Ship Impact techniques are developed. Test objectives will be the same as above. As individual Low Ship Impact techniques are approved for integration into host sonar/fire control systems, follow-on Test Evaluation will be conducted on the appropriate parent system. Test objectives of this phase will be to verify system performance with the technique integrated into system operation.

Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

3. (U) System Characteristics:

Wide Aperture Array System Description (External Arrays):

Physical Characteristics:

Subarray Size
Number of Subarrays
Number of Hydrophones/
Subarray
Acoustic Aperture

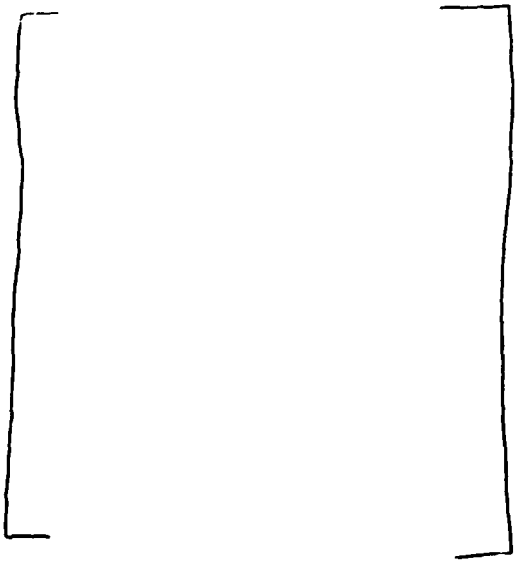
Operating Modes and Associated Features

Passive Acquisition:

Bandwidth (Hertz)
Section width per Tracker

Passive Track:

Number of Independent,
Simultaneous Trackers
Bandwidth (Hertz)
Width of Track Display
Number of Beams
Depression/Elevation Tracking



Program Element: 63590N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Wide Aperture Array (Advanced)
Budget Activity: 4 - Tactical Programs

	OBJECTIVES	
	Goal	Threshold
Range (thousands of yards)	[redacted]	[redacted]
Surface Target/Figure of Merit (Decibels)		
First/Second Convergence Zone Range (thousands of yards)		
Range Error Maximum (thousands of yards)		
Hardware		
Mean Time Between Failure (Hours)	800	400
Mean Time to Repair (Hours)	0.33	1.00
Software Failure		
Mean Time Between Failures (Hours)	240	24
Mean Time to Repair (Hours)	0.08	0.33

	OBJECTIVES	
	Goal	Threshold
Software Fault		
Mean Time Between Failure (Hours)	24	4
Mean Time to Repair (Hours)	0.02	0.08

The goals and thresholds listed in the table will be the baseline for verification during Operational Test and Evaluation. System characteristics, as demonstrated using the AN/BQG-2 systems in USS BAYA and USS HADDOCK, are not included in this description as they could be misinterpreted as being results obtained with Wide Aperture Array system currently being developed.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63601N
DoD Mission Area: 234 - Mine Warfare
Title: Mine Development (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	21,098	13,934	5,555	6,119	Continuing	TBD
S0257	Mine Delivery Systems	3,222	0	0	0	TBD	TBD
	Quantity (Developmental/Operational Test and Evaluation Models)						TBD
S0258	Anti-Sweeper/Anti-Hunter Systems	276	3,293	630	738	Continuing	TBD
	Quantity						TBD
S0259	Remote Control	0	0	0	0	TBD	TBD
S0266	Intermediate Water Depth Mine	9,897	0	0	0	0	
	Quantity (Developmental/Operational Test and Evaluation Models)						TBD
S0267	Mine Improvements	5,720	3,041	4,925	5,381	Continuing	TBD
	(Quantity)						TBD
S1556	Medium Depth Mine	1,983	7,600	0	0	TBD	TBD

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for development of mines, mine delivery and mine support systems to counter surface ships and submarines in support of the Navy's sea control mission. It provides for the development of mine delivery systems to provide a high volume, rapid delivery capability for moored and bottom mines; and anti-sweeper/anti-hunter systems to counter enemy mine countermeasures efforts; mine improvements to optimize the effectiveness of individual mine types and minefield theory development, planning and computer support to the operating forces; a system to enCAPsulated TORpedo mines and a Medium Depth Mine to fill the gap between shallow water QUICKSTRIKE mines and deep water MK 60

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0257, Mine Delivery Systems - No effort planned. The project was terminated in FY 1981 upon delivery and test of the advanced development model of the Cargo Aircraft Minelaying System. Project S0258, Anti-Sweeper/Anti-Hunter Systems - Continue engineering development of anechoic coating for mines and commence advanced development of mine decoys. Project S0267, Mine Improvements - Continue collection, analysis, and publication of mine/target response data to support mine firing mechanism development; continue software improvement for the Mine Warfare Simulator; continue development of

new flight gear for DESTRUCTOR MK 40/QUICKSTRIKE Mine MK 63; continue development of Universal Laying Mine Kits for training/exercise; complete test and evaluation of the British Versatile Exercise Mine; and initiate development of moored exercise mine. Project S1556, Medium Depth Mine - Continue Demonstration and Validation phase of development. FY 1983 funding requirements to be determined.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1981 Descriptive Summary and that shown in this Descriptive Summary are due to the following factors: Project S0257, Mine Delivery Systems - The reduction of 1,755 in FY 1981 is the result of the termination of the Cargo Aircraft Minelaying System development in FY 1981 at the conclusion of the advanced development phase. The only ongoing effort will be an investigation of possibilities for allied co-development of the Cargo Aircraft Minelaying System. Project S0258, Anti-Sweeper/Anti-Hunter Systems - the reduction of 750 in FY 1981 was used to fund shortfalls in Project S0266. A reduction of 90 in FY 1982 results from adjustments in inflation indices. Project S0266, Intermediate Water Depth Mine. FY 1981 funding was reduced by 781. This project is being replaced by Project S1556, Medium Depth Mine which will develop a less sophisticated and costly mine for use in intermediate water depths. Project S0267, Mine Improvements - FY 1981 funding was reduced by 61 due to revision of inflation indices. Project S1556, Continental Shelf Mine - FY 1981 funding of 1,983 remained the same, funding is reduced by 7,400 in FY 1982 as part of Navy application of an undistributed Congressional reduction in research and development funding.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	15,253	24,384	21,484	TBD	TBD	TBD
S0257	Mine Delivery Systems	4,644	4,977	0	TBD	TBD	TBD
S0258	Anti-Sweeper/Anti-Hunter Systems	172	1,026	3,383	TBD	TBD	TBD
S0259	[redacted]	0	0	0	TBD	TBD	TBD
S0266	Intermediate Water Depth Mine	6,600	10,678	0	0	0	TBD
S0267	Mine Improvements	3,837	5,720	3,101	TBD	TBD	TBD
S1556	Continental Shelf Mine	0	1,983	15,000	TBD	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS: To be determined.

Program Element: 63601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for the development of a Cargo Aircraft Minelaying high volume mine delivery systems; a Medium Depth Mine for use [ ]in its anti-submarine mission;[ ]and advanced mine firing mechanisms and mine warfare support systems to counter submarine and surface ships in support of the Navy's sea control mission. The present stockpile of MK 52/55 series mines and DESTRUCTORS provides some capability in water depths down to[ ] However, many of the stockpile mine designs were compromised as a result of Southeast Asia mining campaigns. No further procurement of present stockpile mines is planned and the mine stockpile[ ]new development mines and supportive mine systems become available. The development of mines in this program element plus MK 60 CAPTOR (enCAPsulated TORpedo) (Program Element 24304N) and QUICKSTRIKE (Program Element 64601N) will provide a mine capability against a full spectrum of targets from small craft to submarines and large combatants/supertankers. These mines will be capable of rapid preparation for employment, and will provide resistance to known countermeasure techniques. High volume Cargo Aircraft Minelaying Systems will significantly augment tactical air, P-3, and B52 aircraft delivery capabilities and make rapid planting of long barrier minefields operationally feasible. MK 60 CAPTOR (EnCAPsulated TORpedo), QUICKSTRIKE and Medium Depth mines will replace the present stockpile. In barrier minefields, Medium Depth and QUICKSTRIKE Mines will be used to protect the flanks of the deep water enCAPsulated TORpedo sections of these barriers. In most port closure minefields where shallow and medium depth water exists, Medium Depth Mines and QUICKSTRIKE Mines would provide the necessary capability. Projects ancillary to the above mine and mine delivery hardware developments include programs to increase the effectiveness of minefield planning/analysis techniques; provide a family of exercise mines for fleet training; improve mine firing mechanisms; improve mine counter-countermeasures; provide updated software in the mine warfare simulators for operational training and threat analysis; and provide the capability to [ ] minefields.

(U) The Medium Depth Mine: This project provides the basis for development of a modern, cost effective weapon to counter surface ships and submarines in support of the Navy's sea control mission. The existing stockpile of moored mines was developed between the mid-1940s and mid-1950s. These mines have[ ] For example, their[ ] Furthermore, [ ] The Medium Depth Mine program will provide a new mine[ ] The primary mission of the Medium Depth Mine will be [ ] Also, in conjunction with the new bottom mine (QUICKSTRIKE), the Medium Depth Mine would be used along the flanks of deep water enCAPsulated TORpedo anti-submarine barriers [ ] The Medium Depth mine will satisfy a NATO requirement for a Continental Shelf Mine.

Program Element: 63601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (Advanced)
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: The Intermediate Water Depth Mine (Project S0266) completed exploratory development under Program Element 62633N. This exploratory development effort as well as FY 1981 and prior effort under Project S0266 provide a basis for continuing Project S1556, Medium Depth Mine. Mine Improvements (Project S0267) tasks are related to improvements in the QUICKSTRIKE mines and the MK 67 Submarine Launched Mobile Mine being developed under Program Element 64601N, Mine Development (Engineering), Project S0272 QUICKSTRIKE.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, White Oak, Silver Spring, MD (Lead Laboratory); Naval Mine Engineering Facility, Yorktown, VA; Naval Surface Weapons Center, Dahlgren, VA; Naval Undersea Warfare Engineering Station, Keyport, WA; Naval Coastal Systems Center, Panama City, FL; Naval Underwater Systems Center, Newport, RI. Contractors: Lockheed-Georgia Co., Marietta, GA (Project S0257, Mine Delivery Systems); General Electric, Philadelphia, PA (Project S1556, Medium Depth Mine); Burroughs, Paoli, PA (Project S0267, Mine Improvements).

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0257, Mine Delivery Systems - For Cargo Aircraft Minelaying System: Two contractors completed feasibility/concept studies. Awarded advanced development contract to Lockheed-Georgia. In FY 1981, contractors delivered advanced development hardware and Navy tested hardware from C-130 aircraft. Project S0258, Anti-Sweeper/Anti-Hunter Systems - conducted design definition studies and feasibility studies. Fabricated and tested [redacted] for mines. Project S0266, Intermediate Water Depth Mine - Completed exploratory development in FY 1976. Solicited proposals from contractors to perform concept formulation studies. Six concept formulation study contracts were awarded. Studies were evaluated and two contractors were awarded contracts for four year demonstration and validation programs (advanced development) under provisions of OMB Circular A-109 in November 1980. Terminated contracts in January 1981. Formed Ad Hoc Working Group to structure new development within Project S1556, Medium Depth Mine. Project S0267, Mine Improvements - Completed development of DESTRUCTOR MK 41 and compatible [redacted] flight gear. Completed development of DESTRUCTOR capability in the Actuation Mine Simulator used for mine countermeasures training. Established [redacted] data acquisition ranges and utilized data from these in mine development, minefield planning, and the mine warfare simulator. Began development of a new firing mechanisms data test range, exercise mines and improved mine power sources. Began development of improved flight gear for DESTRUCTOR MK 40/QUICKSTRIKE Mine MK 63 and kits to convert MK 83 bomb cases into Universal Laying Mines for training. Restructured Foreign Mine Simulator development program by initiating a project to test the British Versatile Exercise Mine. Project S1556, Medium Depth Mine - Exploratory development under Program Element 62633N, Undersea Warfare Weaponry Technology investigated various technological areas such as propulsion, guidance, detection, power sources, and structures

aassociated with the Medium Depth Mine mission. In August 1977, the program was restructured to conform with Department of Defense directives 5000.1 and 5000.2. Concept formulation then continued under Project S0266, Intermediate Water Depth Mine with a competitive contractor selection for advanced development. In December 1980, the program was temporarily halted while alternatives were explored to accelerate delivery of the mine to the fleet. In July 1980, General Electric was selected to continue the development with the initial goal of developing a less capable, less expensive mine on an accelerated schedule. This mine would be designed from the start to be upgradable to its full capability after further development of the more complex subsystems.

2. (U) FY 1982 Program: Project S0257, Mine Delivery Systems - Cargo Aircraft Minelaying system - No development effort is planned as project is not currently funded. Conduct discussions with allies on establishment of a co-development program. Project S0258, Anti-Sweeper/Anti-Hunter Systems - begin fabrication and test of engineering development models [redacted] Project S0267, Mine Improvements - Continue to acquire, analyze and incorporate mine/target software into mine development programs, minefield analysis, and the mine warfare simulator. Transfer Target Detecting Devices MK 70/71 to engineering development under Program Element 64601N, Mine Development (Engineering), Project S0272, QUICKSTRIKE. Conduct technical testing and evaluation of improved mine power cells. Procure the United Kingdom Versatile Exercise Mine for evaluation under aegis of PE 65111D; Foreign Weapons Evaluation. Continue DESTRUCTOR MK 40 flight gear, Universal Laying Mine, and power source development. Project S1556, Medium Depth Mine - As a result of reductions in the FY 1983 and out year defense budget, the Medium Depth Mine program was deleted from the FY 1983 Program Objective Memorandum. Therefore, the FY 1982 program has been reoriented to address only the most critical design issues. These efforts will include: [redacted] define and document Medium Depth Mine system level design; collaborate with the United Kingdom's Continental Shelf Mine program in the planning of their guided flight/hydrodynamic test, detection test, and environmental data gathering efforts.

3. (U) FY 1983 Planned Program: Project S0257, Mine Delivery Systems - Cargo Aircraft Minelaying System: No effort planned as project is not currently funded. Project S0258-MJ, Anti-Sweeper/Anti-Hunter Systems - Complete technical and operational evaluation [redacted] Project S0267, Mine Improvements - Continue to acquire, analyze, and incorporate mine/target data into mine development programs, the mine warfare simulator, and minefield analysis techniques. Continue development of mine power sources. Complete mine configuration simulators, laying mine kits, and DESRUCTOR MK 40/QUICKSTRIKE Mine MK 63 flight gear development. Complete evaluation of United Kingdom Versatile Exercise Mine. Start development of moored exercise mine. Project S1556, Medium Depth Mine - To be determined.

4. (U) FY 1984 Planned Program: Project S0258, Anti-Sweeper/Anti-Hunter Systems - Obtain approval for service use [redacted] Project S0267, Mine Improvements - complete development of 2,000 pound Universal Laying Mine. Continue development of actuation and configuration simulators for moored mines; [redacted] new mine

components. Continue the acquisition, analysis, and incorporation of mine/target/environmental data into mine development programs and minefield planning/analysis techniques. Project S1556, Medium Depth Mine - To be determined.

5. (U) Program to Completion: Project S0257, Mine Delivery Systems - Cargo Aircraft Minelaying System: No effort planned as project is not currently funded. Project S0258, Anti-Sweeper/Anti-Hunter Systems - Obtain approval for service use [redacted] Project S0267, Mine Improvements - This is a continuing program for the acquisition of mine/target data and incorporating such data in the mine warfare planning, simulation and mine targeting detecting devices. Continuing efforts also apply to the development of new and improved mine components and support systems. Complete British Versatile Exercise Mine evaluation in FY 1984, and power source development in FY 1987. Project S0259, Remote Control - Develop [redacted] Since a similar project is currently being undertaken by NATO Naval Armaments Group Project Group 23, the possibility exists for co-development and/or co-production with various NATO Allies (i.e., Denmark, Germany, Norway, and the United Kingdom). [redacted] Project S1556, Medium Depth Mine - Development schedule to be determined.

6. (U) Milestones - Project S1556, Medium Depth Mine

Milestone:	Date
Complete Case Motion Detection Test	Sep 1982
Complete Documentation of System Level Design	Sep 1982
Conclude Collaboration with the United Kingdom's Test Planning	Sep 1982
Complete Demonstration and Validation Phase	FY 1984

Project: S1556 Title: Medium Depth Mine
Program Element: 63601N Title: Mine Development (Advanced)
DoD Mission Area: 234 - Mine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project will provide a Medium Depth Mine which will be capable of attacking [ ] A Medium Depth Mine is required to lay approximately [ ] of minefield barrier in areas where water depths are too deep to effectively employ QUICKSTRIKE bottom mines or, where an anti-surface ship capability is required which cannot be provided with the MK 60 Mod 1 (EnCAPsulated TORpedo). It is also envisioned that the Medium Depth Mine will have a larger warhead [ ] so as to be capable of inflicting mission abort damage [ ] This mine will be significantly more effective than the obsolete MK 56/57 moored mines which it will replace, both from an acquisition cost and delivery sortie point of view. Also, the Medium Depth Mine is expected to be more cost effective to employ in many scenarios than would a combination of QUICKSTRIKE and enCAPsulated TORpedo mines.

(U) RELATED ACTIVITIES: Program Element 24304N, Mines and Mine Support, Project S0268 CAPTOR Improvements; QUICKSTRIKE Mine, Program Element 64601N, Project S0272, QUICKSTRIKE.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, White Oak, Silver Spring, MD (lead laboratory); Naval Mine Engineering Facility, Yorktown, VA; Contractors: General Electric Co., Philadelphia, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed exploratory development in FY 1976. Under the aegis of Project S0267, Intermediate Water Depth Mine, solicited proposals from contractors to perform concept formulation studies. Six concept formulation study contracts were awarded. Studies were evaluated and two contractors were awarded contracts for four year demonstration and validation programs (advanced development) under provisions of OMB Circular A-109 in November 1980. Terminated contracts in January 1981. Formed Ad Hoc Working Group to structure new development within Project S1556, Medium Depth Mine. Completed Medium Depth Mine Ad Hoc Team Report.

2. (U) FY 1982 Program: Accomplish cost, schedule and technical planning required to restructure the Medium Depth Mine (MDM) development program to follow one of the following program technological options:

- A [ ]
- A Medium Depth Mine Mod 0/Mod 1 option [ ] that can be upgraded through a pre-planned product improvement program.
- A cooperative development in which the U.S. Medium Depth Mine and United Kingdom Continental Shelf Mine (CSM) would employ the same, or similar [ ] components.

Project: S1556 Title: Medium Depth Mine
Program Element: 63601N Title: Mine Development (Advanced)
DoD Mission Area: 234 - Mine Warfare Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: To be determined.

4. (U) FY 1984 Planned Program: To be determined.

5. (U) Program to Completion: To be determined.

6. (U) Milestones:

Milestone	Date
Complete Analysis of Technical/Programmable Options	May
Milestone I Decision	Jun
Conclude Collaboration with the United Kingdom's Test Planning	Sep
Complete Demonstration and Validation Phase	FY

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1556	Medium Depth Mine	1,983	7,600	0	0	TBD	TBD

Project: S1556
Program Element: 63601N
DoD Mission Area: 234 - Mine Warfare

Title: Medium Depth Mine
Title: Mine Development (Advanced)
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: The major objective of the demonstration and validation program is to conduct critical experiments to demonstrate the performance

2. (U) Operational Test and Evaluation: To be determined.

3. (U) System Characteristics: Detailed Medium Depth Mine characteristics have not yet been fully defined. They are presently being developed as part of the critical design effort to be undertaken in FY 1982 and will be defined in more detail during the demonstration and validation phase.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63610N
Title: Advanced Lightweight Torpedo (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	98,929	105,414	56,784	4,220	0	425,644
S0199	ALWT	98,929	105,414	56,784	4,220	0	425,664

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will develop a new torpedo (designated ALWT) capable of countering the projected submarine threat of the post-1985 period. Improvements in Soviet submarine performance characteristics necessitate the development of the Advanced Lightweight Torpedo (ALWT) as a replacement for the MK 46 torpedo as soon as possible.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 ALWT program will continue advanced development efforts (Demonstration and Validation Phase) with one contractor designing and fabricating a ALWT torpedo model. The decrease in funding from FY 1982 to FY 1983 is due to efforts being transitioned to engineering development under program element 64675N. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: the FY 1982 Descriptive Summary showed the FY 1983 estimate as TBD, but which has since been determined to be $56,784; the decrease of $600 in FY 1982 was a cost escalation decrease and a reduction in contractors and studies funding; the increase of $1,057 in FY 1981 was due to program restructuring.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	60,037	97,872	106,014	TBD	TBD	TBD
S0199	ALWT	60,037	97,872	106,014	TBD	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS: See Descriptive Summary for Program Element 64675N.

Program Element: 63610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The ALWT will have [redacted] The improvements in Soviet submarine performance (speed, hull strength, maneuverability, depth, smaller active acoustic target size, and lower radiated noise) and countermeasures capability necessitate having an advanced anti-submarine warfare torpedo available as a replacement for the lightweight MK 46 torpedo. [redacted] The program includes some modifications to make the ALWT more suitable [redacted] The lightweight homing torpedo is the only conventional anti-submarine warfare weapon for air and surface platforms. The ALWT is under consideration for other applications such as in submarines. [redacted] The objectives of ALWT advanced development are to: (a) verify with advanced development prototype models that the chosen concepts are sound; (b) verify with advanced development prototype models that the hardware/subsystems developed will perform effectively in an operational environment; and (c) provide a fleet weapon detailed design as a basis for approval of the system to be continued into full-scale development and pilot production. The ALWT advanced development consists of two phases. Phase I was a technology assessment phase during which candidate technologies were investigated to allow the Navy and industry to assess the merits of a number of concepts for potential inclusion into the ALWT. Industry was provided the technology development and assessment data to assist them in proposing torpedo designs. Phase II began with selection of two innovative industry-proposed designs for competitive development and validation. Subsequently, one contractor was phased out due to the continued high technical risk of his proposal. An Advanced Mobile Acoustic Torpedo Target is being developed concurrently to provide the target necessary for in-water, dynamic evaluation of the torpedo.

(U) RELATED ACTIVITIES: Program Element 63562N, Submarine Tactical Warfare Systems (Advanced) - Development of improvements to enhance submarine-launched torpedo performance [redacted] and to improve torpedo countermeasures resistance. Program Element 63367N, Submarine Anti-Submarine Warfare Standoff Weapon - Development of a long range, submarine launched anti-submarine warfare weapon system which will deliver a lightweight torpedo against threat submarines. Program Element 62633N, Undersea Warfare Weaponry Technology - [redacted]

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (technical agent and lead laboratory); Naval Surface Weapons Center, White Oak, Silver Spring, MD (warhead and exploder); Naval Underwater Systems Center, Newport, RI (Advanced Mobile Acoustic Torpedo Target); Naval Undersea Warfare Engineering Station, Keyport, WA; and Naval Coastal Systems Center, Panama City, FL. Contractors: Applied Research Laboratory, Pennsylvania State University, State College, PA; Applied Physics Laboratory, University of Washington, Seattle, WA; Applied Research Laboratory, University of Texas, Austin, TX; Honeywell, Inc., Hopkins, MN; and McDonnell Douglas, Huntington Beach, CA are the prime torpedo contractors. Rockwell International, Anaheim, CA is the prime contractor for the Advanced Mobile Acoustic Torpedo Target.

Program Element: 63610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (Advanced)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In September 1978, completed a three year comprehensive assessment of selected torpedo subsystem technologies. In the warhead area, completed medium scale [ ] warhead test, 1/4 scale [ ] tests, breadboard tests of new exploder concepts and [ ] effectiveness studies. In the acoustic area, completed digital models for reverberation, shallow water measurements, high speed self-noise and passive and terminal homing tests against a mobile acoustic target. In propulsion area, completed in-water test program for closed cycle chemical and open cycle systems and laboratory tests for electric systems. In hydrodynamics area, [ ] developments were completed. Following completion of studies and assessments, industry was provided with the results and data to prepare them for a response to the request for proposal released in October 1978. Source selection efforts commenced in January 1979 which led to the award of two advanced development model contracts on 1 August 1979. A companion contract was awarded 2 August 1979 to provide an Advanced Mobile Acoustic Torpedo Target to be used in development, test and evaluation of the torpedoes. Recent development problems have resulted in a [ ] During FY 1980, the two advanced development contractors conducted preliminary design reviews, began the fabrication and testing of many breadboard subsystems, developed software modules, commenced building systems for operation with the Naval Ocean Systems Center hybrid simulator, and started to fabricate brassboard hardware. Development of a [ ] was initiated by Naval Surface Weapons Center, White Oak. During FY 1981, one contractor was phased out. The program was restructured to consist of a single prime contractor, direct Navy laboratory technical management, and a greater degree of iterative prototype design, build and testing to reduce risk. Acoustic and propulsion subsystems were brassboarded and the propulsion subsystem commenced in-water testing. Systems interface and system operations on the Naval Ocean Systems Center Hybrid simulator commenced. Testing [ ] at Naval Surface Weapons Center, White Oak was commenced.

2. (U) FY 1982 Program: Continue advanced development program by completing the initial subsystem and in-water test program and begin validating the performance of full system torpedoes to successfully defeat the threat at acceptable production and life cycle costs and schedule. Commence subsystem design upgrade and testing required for transition to the next full system design iteration. Design and fabrication of the targets will be near completion and in-water testing will be initiated. [ ] full scale testing initiated.

3. (U) FY 1983 Planned Program: Continue validating the performance of the full system torpedo. Complete documentation of the FY 1982 advanced development testing program and Milestone II. A system design will be approved for the engineering development models when the program is authorized to proceed into full scale development. Program transitions from advanced to full scale engineering development. Four targets will complete their test program and be accepted for use in the advanced lightweight torpedo test program. [ ] testing will be completed.

Program Element: 63610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (Advanced)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Complete advanced development testing program.

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

6. (U) Milestones:

		Date
a.	Initiated phase I advanced development	February 1975
b.	Completed phase I of advanced development	September 1978
c.	Initiate phase II of advanced development	August 1979
d.	Complete phase II of advanced development	[redacted]

*Date in parentheses is milestone date shown in the FY 1982 Program Element Descriptive Summary. [redacted] due to program restructuring.

Program Element: 63610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (Advanced)
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: The objectives of the test and evaluation program are to assess and reduce the acquisition risks throughout the system acquisition process and to evaluate the operational effectiveness and suitability of the ALWT. Early developmental testing focused on evaluating the technology associated with several torpedo subsystems including various combinations of guidance sensors, processors and controls; three propulsion systems; and three types of torpedo shapes. The subsystems were developed and evaluated at varying levels due to the difference in maturity of each. Mobile targets were used during early testing to Developmental testing to support full scale development will emphasize laboratory pit tests and in-water runs complemented by extensive series of real time, hardware-in-the-loop hybrid simulation tests. The contractor will be required to develop and provide twenty units (100S series) for the validation phase test programs. Based upon the evaluation of the validation tests and analyses, the ALWT configuration models (200A) will be fabricated and tested. Subsequently, thirty-four units (200B series) will be fabricated for use during technical evaluation to certify that the design meets specified requirements and is ready for operational evaluation.

2. (U) Operational Test and Evaluation: Will be conducted in PE 64675N.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63611M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Assault Vehicles
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	38,591	56,299	73,414	85,805	TBD	TBD
C0016	Mobile Protected Gun System (MPGS)	10,599	23,697	30,583	49,140	TBD	TBD
C0020	Landing Vehicle Tracked (Experimental) (LVT(X))	2,215	12,851	31,625	26,853	TBD	TBD
C1555	Light Armored Vehicle (LAV)	17,986	10,051	11,206	9,812	TBD	TBD
C1293	Stratified Charge Rotary Engine	7,791	9,700	*	*	*	*

* Funded in Program Element 64656M, Marine Corps Assault Vehicles in FY 1983 and subsequent years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides funds to design, develop and test wheeled and tracked vehicles and engines which will meet the firepower and mobility requirements for amphibious operations and subsequent operations ashore in the 1980's.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Mobile Protected Gun System: The scope of effort includes continued development of the 75mm automatic cannon, ammunition and analysis/test of systems integration concepts. Continue the demonstration and validation phase of the Mobile Protected Gun System program. Landing Vehicle Tracked (Experimental): The increase in the FY 1983 request is to provide funding for the progression of this program from Milestone 0 to the Demonstration and Validation Phase. The Demonstration and Validation phase will involve two contractors selected through formal Source Selection prior to the Milestone I refining the Landing Vehicle Tracked (Experimental) design and fabrication of two prototypes each from each vehicle contractor. Developmental/Operational Testing I will be conducted concurrently through the Demonstration and Validation Phase. Light Armored Vehicle: During FY 1983 R&D funds will be expended on continuing test and evaluation of variant vehicles, integration of weapons systems, safety certification of weapons/ammunition, and procuring/testing of additional variants. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The significant changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Mobile Protected Gun System: Program title change as result of joint program with U.S. Army. FY 1981 decrease of $6,637 was due to reprogramming to higher priority programs while working toward joint program agreement with U.S. Army. The FY 1982 decrease of $5,707 is due to the program being jointly funded with the Army in FY 1982. Landing Vehicle Tracked (Experimental): FY 1981 decrease of $3,773 is due to program delays associated with a detailed review of the Request for Proposal to contractors to

insure all technical and Integrated Logistics Support items were included. Light Armored Vehicle: The FY 1981 increase of $1145 is due to funding for test and evaluation contracts. FY 1983 program amounts are now known for all projects instead of TBD as reflected in last year's Descriptive Summary. All other changes are due to refinement of costs including inflation.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9,417	46,868	52,333	TBD	TBD	TBD
C0016	Mobile Protected Weapons System (MPWS)	(4,957)*	17,236	29,404	TBD	TBD	TBD
C0020	Landing Vehicle Tracked (Experimental) (LVT(X))	9,417	6,803	12,866	TBD	TBD	TBD
C1293	Stratified Charge Rotary Combustion Engine	-	5,988	**	**	**	TBD
C1555	Light Armored Vehicle (LAV)	-	16,841	10,063	TBD	TBD	TBD

* Funded in Program Element 63635M in FY 1980.
**Funded in Program Element 64656M, Marine Corps Assault Vehicles.

(U) OTHER APPROPRIATION FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Procurement, Marine Corps 1/						
Light Armored Vehicle	-	36,162	89,723	84,291	495,372	705,548
(Quantity)	-	(60)	(134)	(141)	(TBD)	(TBD)
Mobile Protected Gun System		-	-	-	TBD	TBD
(Quantity)		-	-	-	(TBD)	(TBD)

1/ Does not include Ammunition nor Spare Parts

Program Element: 63611M
Title: Marine Corps Assault Vehicles
DoD Mission Area: 211 - Direct Fire Combat
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Mobile Protected Gun System provides fire support and an anti-armor capability to infantry in both offensive and defensive combat, accompanies helicopterborne infantry in both amphibious assaults and subsequent operations ashore, and is tactically reliable, survivable and effective on potential 1990's battlefields. There is an approved Required Operational Capability (ROC) document. In the FY 1981 Authorization action, the Congress directed that if the Marine Corps and Army proposed development of advanced lightweight combat vehicles for procurement in the late 1980's, they should propose a joint program. On 16 December 1981, a Memorandum of Agreement was signed which joined the Marine Corps' Mobile Protected Weapons System (MPWS) and the Army's Mobile Protected Gun (MPG) programs. A joint Defense Advanced Research Projects Agency/Army/Marine Corps Armored Combat Vehicle Technology Program provided technical data for a follow-on development program. The 75mm automatic cannon, conceived, prototyped, tested and installed on a high mobility chassis in association with the Armored Combat Vehicle Technology program is envisioned as the main armament of the Mobile Protected Gun System. The Mission Element Need Statement (MENS) was approved in 1981 and ten Design Studies contracts were awarded following industry's response to a Request for Proposal (RFP). Landing Vehicle Tracked (Experimental): The purpose of this program is to evaluate conceptual alternatives for fulfilling the mission need for amphibious warfare surface assault, select an alternative and develop it as a replacement for the Landing Vehicle Tracked family of vehicles in the early 1990's. Light Armored Vehicle: The program is an acquisition effort directed toward the procurement of modified "off-the-shelf" light armored vehicles/weapon systems which, based upon the use of a similar chassis, have the potential to be developed into a family of mission variants.

(U) RELATED ACTIVITIES: Mobile Protected Gun System: Effort is related to the Army's Tank and Automotive Technology (PE 63635A) which is the Army's share of this joint program. Landing Vehicle Tracked (Experimental): This program is related to the Marine Corps Landing Vehicle Tracked (LVT7A1) program (PE 64657M) in that the Landing Vehicle Tracked (Experimental) is a Mission Element Need Statement alternative as a follow-on replacement capability. Light Armored Vehicle: The Light Armored Vehicle program is related to the Army's Mobile Protected Gun System (Near Term).

(U) WORK PERFORMED BY: Mobile Protected Gun System: Contractors: Advanced Technology Incorporated, McLean, VA; FMC Corp., San Jose, CA; Chrysler Corp , Sterling Heights, MI; Pacific Car and Foundry Corp., Renton, WA., Alvis Limited, England; General Motors, Canada; Cadillac Gage Company, Warren, MI; ARES Corp., Port Clinton, OH; Teledyne Continental, Muskegon, MI; Bell Aerospace, Buffalo, NY; AAI Corp., Baltimore, MD. In-House: Naval Surface Weapons Center, Dahlgren, VA; U.S. Army Tank and Automotive Command, Warren, MI; Naval Sea Systems Command, Washington, D.C.; Marine Corps Development and Education Command, Quantico, VA; Army Armament Research and Development Command, Dover, NJ; Landing Vehicle Tracked (Experimental): Contractors: Potomac General Research Group, Alexandria, VA; Advanced Technology, Incorporated, McLean, VA; In-House: Naval Coastal Systems Center, Panama City, FL; Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Ships Systems Engineering Station, Philadelphia, PA; Naval Sea Systems Command, Washington, D.C.; Marine Corps Development and Education Command, Quantico, VA; Light Armored Vehicle: In-house: U.S. Army Tank and Automotive Command, Warren, MI; Naval Surface Weapon Center, Dahlgren, VA; U.S. Army Yuma Proving Grounds, Yuma, AZ; U.S. Army Waterways Experiment Station, Vicksburg, MS; U.S. Army Test and Evaluation Command, Aberdeen Proving Grounds, MD; Marine Corps Air Ground Combat Center, 29 Palms, CA. Contractors: Advanced Technology, Inc., McLean, VA; Alvis Limited, England; General Motors of Canada; Cadillac Gage Company, Warren, MI. Advanced Technology, Inc., McLean, VA.

Program Element: 63611M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Assault Vehicles
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Mobile Protected Gun System: The Army, Marine Corps and Defense Advanced Research Projects Agency began pursuing jointly an Armored Combat Vehicle Technology program in September 1976. In November 1977, the program was restructured at the direction of the Under Secretary of Defense, Research and Engineering to permit the possible beginning of a full-scale development effort for a weapon system in FY 1981. The redirection resulted in a revised Memorandum of Understanding agreed to by the participants (Army, Marine Corps and Defense Advanced Research Projects Agency) that emphasized the use of test beds rather than studies. In FY 1979, the Office of the Secretary of Defense (Program Analysis and Evaluation) tasked the Marine Corps and the Army to conduct the Joint Test and Evaluation of Advanced Anti-Armor Vehicles (ARMVAL) and designated the Marine Corps as the lead Service. The Joint Test Directorate was organized and the test started in FY 1980. ARMVAL concluded in FY 1981. The Field Analysis Concept Test (FACT) concluded in FY 1981 and the results are being assessed. Other accomplishments included the conduct of feasibility studies on the 75mm cannon and ammunition. In September 1981, the Marine Corps and U.S. Army agreed to jointly develop the 75mm Automatic Cannon. Landing Vehicle Tracked (Experimental): The Landing Vehicle Assault Tentative Specific Operational Requirement was issued in 1973. In FY 1974 an assessment of the Tentative Specific Operational Requirement was conducted to identify technical problem areas and analyse technological approaches. In FY 1975, potential conceptual designs were investigated to provide a basis for program planning, performance prediction, risk assessment and cost analysis. In FY 1976, competitive conceptual design contracts were awarded to Bell Aerospace, FMC, and Pacific Car and Foundry. In FY 1977, a contract was awarded to Curtiss-Wright for the advanced development of a four-rotor, high horsepower to weight ratio, stratified charge, rotary combustion engine. In FY 1978, the Mission Element Need Statement for Amphibious Warfare Surface Assault (incorporating the Landing Vehicle Assault) was approved by the Secretary of the Navy (Nov. 1977) and forwarded to the Secretary of Defense. In addition, follow-on Landing Vehicle Assault conceptual design contracts were awarded, and competitive conceptual design contracts were awarded to Bell Aerospace, FMC and Booz-Allen Applied Research to investigate the Landing Vehicle Tracked (Experimental), low water speed Mission Element Need Statement alternative. (Funding For FY 1974-FY 1977 was in Program Element 63606M, Advanced Marine Corps Weapons Systems). The Mission Element Need Statement was approved by the Secretary of Defense in October 1978. The Landing Vehicle Assault conceptual design effort was continued with two contractors. The Landing Vehicle Tracked (Experimental) conceptual design contracts were awarded to Bell Aerospace, Inc., AAI Corp., and Pacific Car and Foundry Corp. These contracts demonstrated the technical feasibility of improved combat capabilities in a low profile amphibian vehicle. The advanced development of the rotary engine proceeded and achieved a full power demonstration in September 1979.In January 1979, the Marine Corps cancelled the requirement for the Landing Vehicle Assault due to its large size, high cost and complexity in maintenance, and selected the Landing Vehicle Tracked (Experimental) as the preferred alternative over the Infantry Fighting Vehicle. Therefore, work was started restructuring the four-rotor engine development to a two-rotor development. In FY 1981 the Stratified Charge Rotary Combustion Engine was made into a separate project, now contained in PE 64656M, Marine Corps Assault Vehicles. Light Armored Vehicle: In March 1980 the Marine Corps testified to Congress the need for increased mobility and firepower to enhance its Rapid Deployment Force capability. The Mission Element Need Statement was approved by the Secretary of Defense in 1981. In May 1981 the Army joined the Marine Corps' Light Armored Vehicle Program. In September 1981, four contracts were awarded to provide four vehicles each for the test and evaluation phase of the program.

Program Element: 63611M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Assault Vehicles
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Mobile Protected Gun System: On 16 December 1981, a Memorandum of Agreement joined the Marine Corps' Mobile Protected Weapons System (MPWS) and the Army's Mobile Protected Gun (MPG) programs. Information generated by ongoing developments and concluded studies, such as the Armored Combat Vehicle Technology Program, Field Analysis Concept Test, Advanced Anti-Armor Vehicle Evaluation test, the 75mm automatic cannon development program, and the hybrid/conceptual design studies contracts will be assessed to aid in developing a more affordable and effective Mobile Protected Gun System and assist in the Milestone I decision. Additionally, a Joint Program Management office will be established at the Army's Tank and Automotive Command, a Joint Statement of Requirement (JSOR) will be prepared and development will continue on the 75mm Automatic Cannon. Milestone I is scheduled for the fourth quarter of FY 1982. Landing Vehicle Tracked (Experimental): Select three conceptual design contrctors, two of which will continue into the Demonstration and Validation phase, and prepare Marine Corps Systems Acquisition Review Council I documentation. Concurrently, subsystem and component development (Command, Control and Communication; armor; mine clearance; weapon station; two rotor rotary engine; and lightweight track) will be ongoing. Light Armored Vehicle: Test and evaluation of those candidate vehicles purchased in FY 1981 will be concluded in the 3rd quarter. A selection and production decision (Milestone III) with a production contract award are expected during the 4th quarter FY 1982.

3. (U) FY 1983 Planned Program: Mobile Protected Gun System: Validation/Demonstration Phase contracts will be awarded based on an evaluation of the FY 1982 concept design studies. 75mm Automatic Cannon development continues. Landing Vehicle Tracked (Experimental): Fabricate full-scale mock-ups and conduct model tests. Conduct of the source selection process and two contractors will continue with the Demonstration and Validation Phase. Conduct Milestone I and enter into the Demonstration and Validation Phase. Light Armored Vehicle: Continue integration and testing of different variants.

4. (U) FY 1984 Planned Program: Mobile Protected Gun System: Validation/Demonstration Phase continues. Contractors begin construction of prototypes. Integrated Logistics Support planning continues. Continue development of the 75mm automatic cannon. Landing Vehicle Tracked (Experimental): The Demonstration and Validation phase will be continued with two contractors. Combined DT/OT I with full up prototypes from both contractors will be conducted. Light Armored Vehicle: Continue integration and testing of different variants.

5. (U) Program to Completion: Mobile Protected Gun System: Continue joint development of Mobile Protected Gun System program with U.S. Army. Continue joint 75mm Automatic Cannon development with U.S. Army. Light Armored Vehicle: Continue integration and testing of different variants. Landing Vehicle Tracked LVT(X): The demonstration/validation phase, full-scale development development and testing of the LVT(X) will be pursued and will lead to production and introduction into the Fleet Marine Force.

Program Element: 63611M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Assault Vehicles
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone

Mobile Protected Gun System (MPGS)

		Date
1.	Mission Element Need Statement	FY 1981
2.	Design Study Contract Award	FY 1981
3.	Defense System Acquisition Review Council I (Milestone I)	FY 1982
4.	Defense System Acquisition Review Council II (Milestone II)	FY 1985
5.	Initial Operational Capability	FY 1988

(U) Landing Vehicle Tracked (Experimental)

1.	Mission Element Need Statement		FY 1979
2.	Marine Systems Acquisition Review Council/Milestone I	(FY 1982)*	FY 1983
3.	Marine Systems Acquisition Review Council/Milestone II		FY 1985
4.	Marine Systems Acquisition Review Council/Milestone III		FY 1988
5.	Initial Operational Capability	(FY 1990)*	Early 1990's

(U) Light Armored Vehicle:

1.	Milestone I	FY 1981
2.	Milestone III	FY 1982
3.	Initial Operational Capability (One Company of Vehicles)	CY 1983

* Date shown in FY 1982 Descriptive Summary. Changes are due to program delays associated with a detailed review of the Request for Proposal to contractors to insure all technical and Integrated Logistics Support items were included.

Project: C0016
Program Element: 63611M
DoD Mission Area: 211 - Direct Fire Combat

Title: Mobile Protected Gun System
Title: Marine Corps Assault Vehicles
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Marine Corps needs a direct fire weapons system that is: (1) able to provide fire support and an anti-armor capability to infantry in both offensive and defensive combat; (2) capable of engaging and destroying targets at a maximum range of 4,000 meters; (3) capable of accompanying helicopterborne infantry in both amphibious assaults and subsequent operations ashore; (4) tactically mobile, reliable, survivable and effective on potential 1990's battlefields; and, (5) efficiently transportable by air or sea to potential conflict areas. The Mobile Protected Gun System is intended to satisfy the needs described above. A joint Defense Advanced Research Projects Agency/Army/Marine Corps Armored Combat Vehicle Technology Program has provided technical data that allows the Marine Corps to move into a follow-on development program for a Mobile Protected Gun System. Additional data regarding the tactical utility of lightweight, mobile, and agile vehicles and concepts of employment have been provided by the joint Army/Marine Corps Advanced Anti-Armor Vehicle Evaluation and the Marine Corps' Field Analysis Concept Test, both concluded in FY 198'. The 75mm Automatic Cannon, conceived, prototyped, tested and installed on a high mobility chassis in association with the Armored Combat Vehicle Technology Program, is envisioned as the main armament of the Mobile Protected Gun System. On 16 December 1981, a Memorandum of Agreement joined the Marine Corps' Mobile Protected Weapons System (MPWS) and the Army's Mobile Protected Gun (MPG) programs.

(U) RELATED ACTIVITIES: Mobile Protected Gun System effort is related to the Army's Tank and Automotive Technology (PE 63635A) which provides a share of the funding to a joint Mobile Protected Gun System program. The Marine Corps Light Armored Vehicle is a modified off-the-shelf procurement of a family of variant vehicles to immediately increase the firepower and mobility of Marine infantry forces. However, the Light Armored Vehicle is an immediate procurement effort to satisfy an existing need while the Mobile Protected Gun System is a development effort to satisfy a late 1980's and beyond need for a tactically mobile and lethal direct fire infantry support weapons system.

(U) WORK PERFORMED BY: Contractors: Advanced Technology, Incorporated, McLean, VA; FMC Corp., San Jose, CA; Chrysler Corp., Sterling Heights, MI; Pacific Car and Foundry Corp., Renton, WA; Alvis Limited, England; Teledyne Continental, Muskegon, MI; Bell Aerospace, Buffalo, NY; AAI Corp., Baltimore, MD; General Motors, Canada; Cadillac Gage Company, Warren, MI; ARES Corporation, Port Clinton, OH; In-House: Naval Surface Weapons Center, Dahlgren, VA; Marine Corps Development and Education Command, Quantico, VA; Army Armament Research and Development Command, Dover, NJ; Naval Sea System Command, Washington, D.C., U.S. Army Tank and Automotive Command, Warren, MI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Army, Marine Corps and Defense Advanced Research Projects Agency began jointly pursuing an Armored Combat Vehicle Technology program in September 1976. In November 1977, the program was restructured at the direction of the Under Secretary of Defense, Research and Engineering to permit the possible beginnning of a full-scale development effort for a weapon system in FY 1981.The redirection resulted in a revised Memorandum of Understanding agreed to by the participants (Army, Marine Corps and Defense Advanced Research Projects Agency) that emphasized the use of test beds rather than studies. The Memorandum of Understanding provided for a joint operational test and evaluation. In FY 1979, the Office of

Project: C0016 Title: Mobile Protected Gun System
Program Element: 63611M Title: Marine Corps Assault Vehicles
DoD Mission Area: 211 - Direct Fire Combat Budget Activity: 4 - Tactical Programs

the Secretary of Defense (Program Analysis and Evaluation) tasked the Marine Corps and the Army to conduct the Joint Test and Evaluation of Advanced Anti-Armor Vehicles and designated the Marine Corps as the lead Service. The Joint Test Directorate was organized and preparations were initiated for the conduct of the test in FY 1980. Both of these tests were concluded in FY 1981. Other accomplishments included the conduct of feasibility studies on the 75mm cannon and ammunition; fabrication and testing of technologically advanced armored combat test vehicles; fabrication and testing of the 75mm automatic cannon, ammunition and fire control system; installation and test of the 75mm cannon on advanced combat test vehicles; and operational testing of surrogate vehicles as part of the Marine Corps Field Analysis Concept Tests. A Mission Element Needs Statement (MENS) and a Required Operational Capability (ROC) for the Mobile Protected Weapons System were approved in FY 1981. Ten Design Studies contracts were released to Industry in June for (3) hybrid and (7) conceptual vehicles. In September 1981, the U.S. Army and Marine Corps agreed to jointly develop the 75mm Automatic Cannon.

2. (U) FY 1982 Program: On 16 December 1981, a Memorandum of Agreement joined the Marine Corps' Mobile Protected Weapons System (MPWS) and the Army's Mobile Protected Gun (MPG) programs. Information generated by ongoing developments and concluded studies, such as the Armored Combat Vehicle Technology program, Field Analysis Concept Test, Advanced Anti-Armor Vehicle Evaluation test, the 75mm automatic cannon development program, and the design studies contracts will be assessed to aid in developing a more affordable and effective Mobile Protected Gun System and assist in the Milestone I decision. Additionally, a Joint Program Management office will be established at the Army's Tank and Automotive Command, a Joint Statement of Requirement (JSOR) will be prepared and development will continue on the 75mm Automatic Cannon.

3. (U) FY 1983 Planned Program: Validation/Demonstration Phase contracts will be awarded based on an evaluation of the FY 1982 concept design studies. The year's efforts will consist of initial system designs, ordering of long lead materials for prototypes, initiation of prototype fabrication, system integration planning and initiation of Integrated Logistic Support activities. Additionally, continue 75mm Automatic Cannon development.

4. (U) FY 1984 Planned Program: Validation/Demonstration Phase continues. Contractors begin construction of prototypes. Integrated Logistics Support planning continues. Development of 75mm Automatic Cannon continues.

5. (U) Program to Completion: Continue joint development of Mobile Protected Gun System and 75mm Automatic Cannon.

Project: C0016 Title: Mobile Protected Gun System
Program Element: 63611M Title: Marine Corps Assault Vehicles
DoD Mission Area: 211 - Direct Fire Combat Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone	Date
1. Mission Element Need Statement	FY 1981
2. Design Study Contract Award	FY 1981
3. Defense System Acquisition Review Council I (Milestone I)	FY 1982
4. Defense System Acquisition Review Council II (Milestone II)	FY 1985
5. Initial Operational Capability	FY 1988

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0016	Mobile Protected Gun System	10,599	23,697	30,583	49,140	TBD*	TBD

* Changes to Program Element 64656M in FY 1985

Project: C0020 Title: Landing Vehicle Tracked (Experimental)
Program Element: 63611M Title: Marine Corps Assault Vehicles
DoD Mission Area: 211 - Direct Fire Combat Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The requirement is primarily driven by the necessity for minimizing ship and craft/vehicle vulnerability during the amphibious assault and enhancing combat capability in subsequent operations ashore. The capability for conducting the assault from variable launch distances is required. This will allow tailoring the assault to the threat.

(U) The program was structured to comparatively evaluate conceptual alternatives for fulfilling this mission need, select an alternative and develop it as a replacement for the current Landing Vehicle Tracked-7 family of amphibious vehicles. Three alternatives were evaluated:

(1) (U) High-Speed Assault Amphibian. This concept would utilize high-speed amphibians for the movement of troops from ship to shore, across the beach and overland in the same vehicles. The amphibians would be characterized by a troop capacity of 18-22, a water speed of at least 25 miles per hour, and fighting vehicle capabilities for subsequent operations ashore. The water speed of the vehicles would permit launch from up to 25 miles from the beach.

(2) (U) Low-Speed Assault Amphibian (Landing Vehicle Tracked (Experimental)). This concept would utilize ships or high-spee Navy landing craft for the movement of troops in low-speed assault amphibians to an appropriate point offshore. The vehicles would then be launched to proceed to the shore and inland. The amphibians would be characterized by a troop capacity of 18-22, a water speed of about eight miles per hour, and fighting vehicle capabilities for subsequent operations ashore. The water speed of the vehicles would permit launch from up to 10 miles from the beach.

(3) (U) Infantry Fighting Vehicle. This concept would utilize high-speed Navy landing craft for the movement of troops in fighting vehicles from ship to shore. The vehicles (currently under development by the U.S. Army) would be configured for land combat but would possess the capability for crossing lakes and rivers. Since they would not be capable of traversing the surf zone, they would be discharged directly on the beach. They would be characterized by a troop capacity of 6 and fighting vehicle capabilities for subsequent operations ashore. The limited troop capacity of the Infantry Fighting Vehicle would necessitate the procurement of three times as many Infantry Fighting Vehicles as Landing Vehicles Assault or Landing Vehicles Tracked (Experimental). This fact, in turn, would require commensurate increases in the number of landing craft and ships required for the amphibious assault.

(U) RELATED ACTIVITIES: The Landing Vehicle Tracked (LVT7A1) Program, program element 64657M, will extend the life of the current assault amphibian (Landing Vehicle Tracked-7) until the introduction of the selected Mission Element Need Statement alternative.

(U) WORK PERFORMED BY: Contractors: AAI Corp., Cockeysville, MD; Bell Aerospace, Buffalo, NY; FMC, San Jose, CA; Pacific Car and Foundry, Renton, WA; Curtiss-Wright, Incorporated, McLean, VA; In-House: Naval Surface Weapons Center, (NSWC), Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Sea Systems Command, Arlington, VA; Marine Corps Development and Education Command, Quantico, VA; Naval Coastal Systems Center, Panama City FL.

Project: C0020
Program Element: 63611M
DoD Mission Area: 211 - Direct Fire Combat

Title: Landing Vehicle Tracked (Experimental)
Title: Marine Corps Assault Vehicles
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Landing Vehicle Assault Tentative Specific Operational Requirement was issued in 1973. In FY 1974 an assessment of the Tentative Specific Operational Requirement was coordinated to identify technical problem areas and analyze technological approaches. In FY 1975, potential conceptual designs were investigated to provide a basis for program planning, performance prediction, risk assessment and cost analysis. In FY 1976 competitive conceptual design contracts were awarded to Bell Aerospace, FMC, and Pacific Car and Foundry. In FY 1977 a contract was awarded to Curtiss-Wright for the advanced development of a four-rotor, high horsepower to weight ratio, stratified charge, rotary combustion engine. In FY 1978 the Mission Element Need Statement for Amphibious Warfare Surface Assault (Incorporating the Landing Vehicle Assault) was approved by the Secretary of the Navy (Nov 1977) and forwarded to the Secretary of Defense. In addition, a full-scale planing hull was tested to investigate ride quality considerations, and competitive conceptual design contracts were awarded to Bell Aerospace, FMC, and Booz-Allen Applied Research to investigate the Landing Vehicle Tracked (Experimental), low water speed Mission Element Need Statement alternative. (Funding for FY 1974-FY 1977 was in Program Element 63606M, Advanced Marine Corps Weapons System). The Mission Element Need Statement was approved by the Secretary of Defense in October 1978. The Landing Vehicle Assault conceptual design effort (including scale model testing and concept mockups reflecting selected critical subsystems) was accomplished with three contractors. The Landing Vehicle Tracked (Experimental) conceptual design effort was also continued. The advanced development of the four-rotor stratified charge rotary combustion engine proceeded and achieved a full power demonstration in September 1979. In January 1979, the Marine Corps cancelled the requirement for the Landing Vehicle Assault due to its large size, high cost and complexity in maintenance, and selected the Landing Vehicle Tracked (Experimental) as the preferred alternative over the Infantry Fighting Vehicle. Therefore, work was started restructuring the four-rotor development to a two-rotor engine development. Efforts after this event included the initiation of preparations of the Acquisition Strategy, initiation of conceptual studies, conduct of trade-off analyses and commencement/continuation of subsystem component development. Continuation of advanced development (conceptual phase efforts included studies to determine viable Landing Vehicle Tracked (Experimental)) conceptual designs; conduct of trade-off analyses on vehicle subsystems and components; selection of a vehicle design for use in the Cost and Operational Effectiveness Analysis and development of an LVT(X) Required Operational Capability (ROC) for a family of vehicles to include personnel, command, recovery, assault gun and engineer variants. Develop a Request for Proposal (RFP) for the final competitive conceptual design contract from which three will be selected. Rotary engine development was directed towards a two-rotor high horsepower-to-weight ratio engine intended for both the Landing Vehicle Tracked (Experimental) and the Mobile Protected Gun System. Marine Corps efforts towards the Army's Infantry Fighting Vehicle were limited to monitoring. Work in command, control, communications modules, weapon station, assault gun capabilities and lightweight tracks continued.

2. (U) FY 1982 Program: Select three conceptual design contractors, two of which will continue into the Demonstration and Validation phase. Prepare Marine Corps Systems Acquisition Review Council-I documentation. Efforts during this period will also include: update of threat assessment with Nuclear, Biological, Chemical and Electronic Warfare information; development of preliminary designs of the basic personnel version of the Landing Vehicle Tracked (Experimental); conduct of research, development, test and evaluation planning and costs projections; development of reliability, availability, maintainability-

durability analyses and predictions; construction of full-scale mockups; and conduct of model tests. General conceptual design for the command, recovery, assault gun and engineer variants will also be developed. Concurrently, subsystem and component developments (e.g., command, control and communication modules; weapon station; assault gun vehicle variant development; two-rotor rotary engine; lightweight track) will be ongoing.

3. (U) FY 1983 Planned Program: Efforts will include: Conduct of source selection process and selection of two contractors to enter into the Demonstration and Validation phase; conduct of Marine Systems Acquisition Review Council I.

4. (U) FY 1984 Planned Program: Demonstration and Validation phase efforts with two contractors will be continued. Developmental Test/Operational Test I will be initiated and conceptual design for the vehicle variants will be continued.

5. (U) Program to Completion: The full-scale development and testing of the selected vehicle and engine will be pursued and will lead to production and introduction into the Fleet Marine Force.

6. (U) Milestones:

Milestone:		Date
1. Mission Element Need Statement		FY 1979
2. Marine Systems Acquisition Review Council/Milestone I	(FY 1982)*	FY 1983
3. Marine Systems Acquisition Review Council/Milestone II		FY 1985
4. Marine Systems Acquisition Review Council/Milestone III		FY 1988
5. Initial Operational Capability	(FY 1990)*	Early 1990's

* Date shown in FY 1982 Descriptive Summary. Changes are due to program delays associated with a detailed review of the Request for Proposal to contractors to insure all technical and Integrated Supported items were included.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0020	Landing Vehicle Tracked (Experimental)	2,215	12,851	31,625	26,853	TBD*	TBD

* Changes to PE 64656M in FY 1986

Project: C1555 Title: Light Armored Vehicle
Program Element: 63611M Title: Marine Corps Assault Vehicles
DoD Mission Area: 211 - Direct Fire Combat Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Light Armored Vehicle program is an acquisition effort directed toward the procurement of modified "off-the-shelf" lightweight armored vehicles/weapon systems which, based upon the use of a similar chassis, have the potential to be developed into a family of mission variants. The procurement of vehicles under this program is directed toward the improvement of the operational capability of Marine forces affiliated with the Rapid Deployment Force. It is envisioned that this lightweight (maximum 14.5 tons) armor protected, helicopter transportable family of vehicles will greatly increase the mobility and firepower of the Marine Corps. The thrust of the Light Armored Vehicle program will be to identify and evaluate vehicle options and to select, procure and field the basic vehicle with mission variants at the earliest possible date.

(U) RELATED ACTIVITIES: The Light Armored Vehicle program is related to the Mobile Protected Gun System in the sense that both programs involve light weight armored vehicles. The Light Armored Vehicle is an immediate procurement effort to satisfy an existing need for improved tactical mobility and fire power capabilities, whereas the Mobile Protected Gun System is a development effort to field a more capable direct fire infantry support weapon system in the late 1980's.

(U) WORK PERFORMED BY: U.S. Army Tank-Automotive Command, Warren, MI; Naval Surface Weapons Center, Dahlgren, VA; Advanced Technology, Inc., McLean, VA; U.S. Army Yuma Proving Grounds, Yuma, AZ; U.S. Army Waterways Experiment Station, Vicksburg, MS; U.S. Army Test and Evaluation Command, Aberdeen Proving Grounds, MD; Marine Corps Air Ground Combat Center, 29 Palms, CA; Alvis Limited, England; General Motors of Canada; Cadillac Gage Company, Warren, MI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In March 1980 the Marine Corps testified to Congress the need for increased mobility and firepower to enhance its Rapid Deployment Force capability. The Required Operational Capability was approved at Headquarters, Marine Corps and the Mission Element Need Statement was approved by the Secretary of Defense in 1981. The source selection process evaluated the proposals and, based upon the source selection criteria, selected the candidate vehicles which most nearly met the stated requirements. The contracts for these vehicles was awarded during the fourth quarter FY 1981 and testing of the candidate vehicles commenced during the first quarter FY 1982.

2. (U) FY 1982 Program: Test and evaluation of those candidate vehicles purchased in FY 1981 will be concluded in the third quarter. A selection and production decision (Milestone III) with a production contract award are expected during the fourth quarter. Additionally, R&D funds will be expended on the integration of weapon systems, safety certification of weapons/ ammunition and procurement of additional test variants (Antitank, Mortar, Logistics and Maintenance/Recovery).

3. (U) FY 1983 Planned Program: Complete test/integration of the Light Armored Vehicle variants (Antitank, Mortar, Logistics and Maintenance/Recovery). Procure additional test variants (Air Defense and Command and Control).

Project: C1555 Title: Light Armored Vehicle
Program Element: 63611M Title: Marine Corps Assault Vehicles
DoD Mission Area: 211 - Direct Fire Combat Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Complete test and integration of Light Armored Vehicle Variants. (Air Defense and Command and Control).

5. (U) Program to Completion: Complete integration and testing of variants in FY 1987.

6. (U) Milestones:

Milestone:		Date
1.	Milestone 0	FY 1981
2.	Milestone III	FY 1982
3.	Initial Operational Capability (One Company)	CY 1983

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C1555	Light Armored Vehicle	17,986	10,051	11,206	9,812	TBD	TBD

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63634N
Title: Tactical Nuclear (TACNUC) Development
DOD Mission Area: 244 - Sea Control Theater Nuclear Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	792	723	3,464	4,183	Continuing	Continuing
S0342	Tactical Nuclear Development	792	723	3,464	4,183	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provide the necessary Phase 1 (conceptual), Phase 2 (technical feasibility), and other studies to support modernization of Navy and Marine Corps tactical nuclear weapons. These studies are by joint Department of Energy - DOD agreement as a mandatory prerequisite to nuclear weapon engineering development. Develop naval nuclear warfare simulation to analyze the effectiveness of tactical nuclear forces in extended duration campaigns. Studies will support the Chief of Naval Operations and Joint Chiefs of Staff directed modernization program.

(U) BASIS FOR FY 1983 RDT&E REQUEST: (U) Continue Phase 2 Study of common ASW nuclear warhead. Complete Nuclear Warfare Publication 28 update. Continue Naval Nuclear Warfare Simulation development. Initiate survivability study(s) which result(s) from Defense Nuclear Agency-sponsored Theater Nuclear Force *Survivability Security and Safety Study*. Institute a study to investigate the application of insertable nuclear component technology to naval systems. Continue the Phase 2 Study of a nuclear warhead for an air to air missile. Update completed Phase 2 studies as required. The increase from FY 1982 to FY 1983 is due to a change in program scope to include new insertable nuclear component studies, an increased cost for the common ASW nuclear warhead study as it enters engineering development, and the addition of the Phoenix nuclear warhead Phase 2 feasibility study. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: The reduction of 98 in FY 1981 is due to an inflation reduction. The reduction of 76 in FY 1982 results from the general Navy budget reduction. The addition of 2,589 in FY 1983 is due to a change in scope to include new insertable nuclear component technology studies, an increased cost for the common ASW nuclear warhead study as it enters engineering development, and the addition of the Phoenix nuclear warhead Phase 2 feasibility study.

Program Element: 63634N
DOD Mission Area: 244 - Sea Control Theater Nuclear Warfare

Title: Tactical Nuclear (TACNUC) Development
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	684	890	799	875	Continuing	Continuing
S0342	Tactical Nuclear Development	684	890	799	875	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 63634N
Title: Tactical Nuclear (TACNUC) Development
DOD Mission Area: 244 - Sea Control Theater Nuclear Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The objective of Tactical Nuclear Warfare Development is to provide for a credible tactical nuclear warfare capability at sea and projection ashore. As a result of the 1977 Supplement to the 1953 Agreement for the Development, Production, and Standardization of Atomic Weapons between the Atomic Energy Commission and Department of Defense, the scope and details required in Phase 1 and 2 studies have been expanded beyond the point at which studies can be properly conducted out of Systems Command overhead funds, as was done in the past. In addition, to implement the Chief of Naval Operations modernization and Joint Chiefs of Staff emergency actions programs, vigorous studies are required to (1) preclude block obsolescence of the existing stockpile, and (2) assure safe, rapid, and economical means of performing emergency destruction/denial/disablement when required. Further, an Office of the Secretary of Defense requirement of 1975 requires special nuclear safety certification of all handling equipment and procedures used for logistic movement of nuclear weapons. Phase 1 and 2 studies of antisubmarine warfare, strike warfare, and antiair warfare nuclear capabilities are required, which should determine economic effectiveness and military utility of nuclear vs conventional weapons. This includes joint Navy-Department of Energy conceptualization and technical feasibility studies, life cycle cost analyses, and employment/deployment planning, in addition to Navy supporting research on optimization of task force composition, array, and tactics for tactical nuclear warfare at sea. The emergency action options and safety certification efforts have been accepted in the past using earlier pseudo standards. However, new standards and policies have evolved as a result of the recently concluded Department of Energy-DOD safety evaluations and Joint Chiefs of Staff-directed analyses of security, command and control. Development of the naval nuclear warfare simulation will apply computerized techniques to analyze optimum mixes of nuclear and conventional weapons, and the utility of tactical nuclear weapon systems and forces in various extended scenarios against a full spectrum of enemy threats.

(U) RELATED ACTIVITIES: PE 63367N Common ASW Standoff Weapon. The Phase 2 study for the common ASW nuclear warhead will result in the nuclear payload for the Common ASW Standoff Weapon.

(U) WORK PERFORMED BY: Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Weapons Center, China Lake, CA; Naval Weapons Evaluation Facility, Albuquerque, NM; John Hopkins University (Applied Physics Laboratory), Silver Spring, MD; DOE Laboratories.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed Navy Nuclear Projectile Phase 1 Study. Conducted technical support in the areas of small-diameter, lightweight nuclear device technology. Commenced development of a computer simulation to examine dynamic interaction of nuclear armed friendly and enemy forces in extended campaigns. Completed Phase 1 (Conceptualization) Study and commenced Phase 2 (Feasibility) Study for common anti-submarine warfare nuclear warhead. Completed development of ASW portion (Phase 1) of naval nuclear warfare simulation. Commenced Phase 2 naval nuclear warfare simulation development to expand analysis capability into all naval warfare areas. Commenced use of naval nuclear warfare simulation to examine tactical nuclear trade offs. Completed nuclear safety certification efforts.

(Formerly Restricted Data)

Program Element: 63634N
DOD Mission Area: 244 - Sea Control Theater Nuclear Warfare

Title: Tactical Nuclear (TACNUC) Development
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Continue Phase 2 feasibility study(s) on common ASW nuclear warhead. Continue Nuclear Warfare Publication 28 update efforts. Complete naval nuclear warfare simulation Phase 3 development. Commence Phase 4 naval nuclear warfare simulation development to expand and refine campaign analysis capabilities. Continue tactical nuclear system trade off analyses.

3. (U) FY 1983 Planned Program: Commence insertable nuclear component study to determine their applicability to Navy weapon systems. Complete Nuclear Warfare Publication 28 update efforts. Complete naval nuclear warfare simulation Phase 4. Continue use of naval nuclear warfare simulation to examine tactical nuclear weapon systems and force trade offs in varying tactical nuclear campaign scenarios. Continue Phase 2 Feasibility study on common ASW nuclear warhead. Commence Phase 1 (Conceptualization) Study of supersonic antiship weapon. Commence Phase 2 Study of PHOENIX air-to-air missile. Commence feasibility study of advance concepts for emergency denial actions. Establish Navy-Marine Corps nuclear weapon planning, acquisition, acceptance, and logistic support model for application to all future Navy-Marine Corps nuclear weapon programs. Determine requirements for reestablishing in-house Navy capability to design modular nuclear weapon fuzes, adaption kits, an/or microcircuitry that are hardened to electromagnetic pulse and other adverse nuclear environments. Commence establishing standards and criteria for nuclear safety analyses of nuclear weapon-unique software. Formulate and develop CNO procured guide for CMC and the "preferred" emergency denial action for nuclear weapon destruction in the event of various potential threats.

4. (U) FY 1984 Planned Program: Complete Phase 2 feasibility study for common ASW nuclear warhead. Continue naval nuclear warfare simulation development. Complete Phase 2 Study of PHOENIX air-to-air missile. Complete Phase 1 Study of supersonic antiship weapon. Commence Phase 1 Study [redacted] Complete feasibility study of advance concepts for emergency denial actions. Incorporate vulnerability/survivability assessment criteria into the Navy-Marine Corps nuclear weapon acceptance program model. Commence development [redacted] Promulgate standards and criteria for nuclear safety analyses of nuclear weapon-unique software. Commence conceptionalization study of [redacted] anti-submarine warfare system. Commence feasibility study [redacted]

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63635M
Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
DoD Mission Area: 211 - Direct Fire Combat
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,401	3,336	7,812	4,341	Continuing	Continuing
C0008	8-Inch Laser Homing Ordnance	1,475	994	2,220	*	*	*
C0011	Marine Corps Ground Weaponry	81	62	69	71	Continuing	Continuing
C0014	Joint Service Small Arms Program	845	1,060	3,389	3,479	Continuing	Continuing
C1294	Field Artillery Rocket System	-	-	1,258	*	*	*
C1295	Artillery Direct Fire Sight	-	220	398	*	*	*
C1598	Nuclear/Biological/Chemical Equipment	**	**	478	791	TBD	TBD

* Funded in Program Element 64657M, Marine Corps Ground Combat/Supporting Arms Systems (Engineering).
** This new project was a subproject of C0011, Marine Corps Ground Weaponry in FY 1981 and FY 1982; however efforts are to monitor U.S. Army RDT&E projects.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element includes Research, Development, Test and Evaluation efforts for the advanced development of Marine Corps equipment and systems required for the conduct of close combat and fire support and the provision of battlefield mobility.

(U) BASIS FOR FY 1983 RDT&E REQUEST: 8-Inch Laser Homing Ordnance: To fabricate airframe hardware and assemble prototype rounds for Development Test I. Testing will begin of all-up projectile. Conduct Development Test I. The increase of 1,226 in FY 1983 over FY 1982 occurs because of the costs associated with the fabrication of the airframe hardware and the assembling of prototype rounds. Additionally, the costs associated with the conduct of Development Test I contributed to the cost growth for FY 1983. Marine Corps Ground Weaponry: Monitor other service developments of USMC interest. Joint Service Small Arms Program: Continue support of Marine Corps requirements under this joint program. FY 1983 increase of 1,329 over FY 1982 funds is due to increased emphasis on small arms developments. Artillery Direct Fire Sight: New start for development of a direct fire sight. Field Artillery Rocket System: To complete launcher design, range tables, and fuze design. Prepare test and evaluation plan. Nuclear/Biological/Chemical Equipment: New start for procurement of Nuclear/Biological/Chemical defense equipment for operational testing by the Fleet Marine Forces, for participation in evaluation of equipment developed by other Services and foreign governments and to fund development of equipment meeting unique amphibious requirements. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 63635M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: 8-Inch Laser Homing Ordnance: The decrease in FY 1982 of 13 and FY 1983 of 78 are due to budget adjustments. Shoulder Launched Multipurpose Assault Weapon: Efforts for this project transitioned to PE 64657M, Marine Corps Ground Combat Support Arms Systems (Engineering); Marine Corps Ground Weaponry: FY 1981 increase of 40 was due to request by the Office of the Secretary of Defense for the Marine Corps to test a proposed modification to a Tow Missile. Joint Service Small Arms Program: FY 1981 decrease of $196 was due to reprogramming to a higher priority project. FY 1982 and FY 1983 decreases from previous estimates are due to inflation/escalation reduction. Mobile Protected Weapon System: FY 1981 efforts transitioned to PE 63611M, Marine Corps Assault Vehicles; Fire and Forget Anti-Tank/Assault Missile System: Efforts were terminated in FY 1981. Field Artillery Rocket System: This program funded here in FY 1983 only. Nuclear/Biological/Chemical Equipment: An FY 1983 new program initiation. Other minor differences are due to budget adjustments.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,343	2,680	4,498	7,617	Continuing	Continuing
C0008	8-Inch Laser Homing Ordnance	1,552	1,475	1,007	2,298	*	*
C0010	Shoulder-Launched Multipurpose Assault Weapon	684	*	*	*	*	*
C0011	Marine Corps Ground Weaponry	148	41	62	63	Continuing	Continuing
C0014	Joint Service Small Arms Program	2	1,041	2,088	3,507	Continuing	Continuing
C0016	Mobile Protected Weapons System	4,957	**	**	**	**	**
C0034	Fire and Forget Anti-Tank/Assault Missile System	-	123	1,120	1,519	19,272	22,034
C1295	Artillery Direct Fire Sight	-	-	221	230	644*	1,095

* Funded under 64657M, Marine Corps Ground Combat/Supporting Arms Systems (Engineering).
** Funded in PE 63611M, Marine Corps Assault Vehicles.

Program Element: 63635M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATIONS FUNDS: Procurement Marine Corps

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Machine Gun (SAW) Quantity	-	6.4 (2117)	8.4 (2907)	8.2 (3000)	TBD	TBD
Machine Gun (.50 Cal) Quantity	-	3.7 (408)	3.0 (273)	-	TBD	TBD
Rifle (5.56mm M16A1) Quantity	-	18.1 (40,222)	28.5 (54,725)	11.2 (20000)	TBD	TBD
9mm Hand Gun Quantity	-	-	2.0 (5000)	10.3 (22850)	TBD	TBD
Machine Gun (7.62 M60) Quantity	-	11.5 (3598)	.2 (60)	-	TBD	TBD
Machine Gun (40mm MK19) Quantity		20.6 (792)	16.5 (570)	-	TBD	TBD

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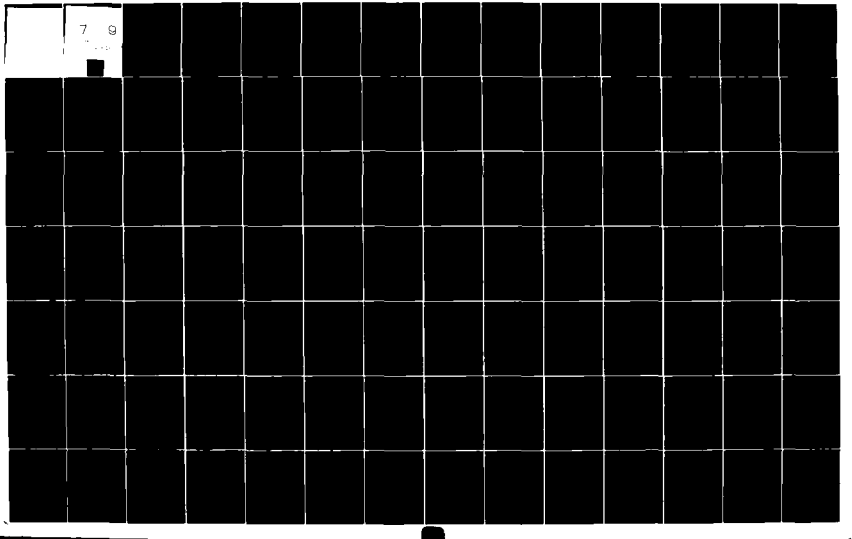

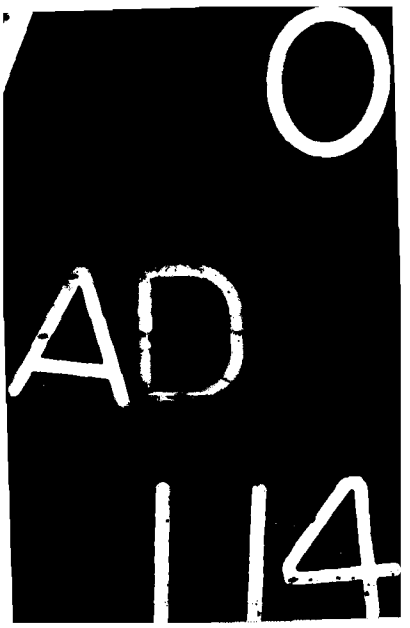
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Program Element: 63635M
Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
DoD Mission Area: 211 - Direct Fire Combat
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: 8-Inch Laser Homing Ordnance: This is a joint program with the Army to develop an 8-Inch Extended Range Guided Projectile. The 8-Inch Laser Homing Ordnance is a semi-active, extended range, laser-guided projectile which will be employed against armored and fortified targets out to a range of 40 kilometers. This munition will provide precision fires well forward of the Forward Edge of the Battle Area. Laser designation may be provided by ground or airborne designators. Marine Corps Ground Weaponry: This program provides for monitoring the efforts of national and international ground weapons systems developments including chemical and biological systems, anti-tank, artillery and naval gunfire weapons, and area munitions. Joint Service Small Arms Program: To manage and administer the development of small arms required by the Army, Navy, Marine Corps, Air Force and Coast Guard. Artillery Direct Fire Sight: To develop a direct fire sight having a range finding capability to attack direct fire targets in urban/fortified positions and for self defense against armored vehicles and mechanized infantry. Field Artillery Rocket System: Provides a rapidly deployable, medium range highly mobile, lightweight, ground-to-ground rocket system. It is intended for use as an indirect fire, area weapon system to suppress, neutralize or destroy enemy artillery fire support, forward air defenses, C3 systems, personnel and vehicles. Nuclear/Biological/Chemical Equipment: Provides for RDT&E of Nuclear/Biological/Chemical Defense equipment to meet Marine Corps unique requirements for amphibious operations in a Nuclear/Biological/Chemical environment.

(U) RELATED ACTIVITIES: 8-Inch Laser Homing Ordnance: Related to the Army 155mm Cannon-Launched Guided Projectile (PE 63621A) and the Navy 5-Inch Program (PE 64608N) Field Artillery Rocket System: Related to Army Multiple Launch Rocket System (MLRS); the Mark 71 5-Inch Zuni Rocket.

(U) WORK PERFORMED BY: 8-Inch Laser Homing Ordnance: In-house: Program Manager, Cannon Artillery Weapons Systems, Picatinny Arsenal, Dover, NJ. Marine Corps Ground Weaponry: In-house: Marine Corps Development and Education Command, Quantico, VA. Joint Service Small Arms Program: In-house: *Small Caliber and Fire Control Laboratory*, Picatinny Arsenal, Dover, NJ. Artillery Direct Fire Sight: In-house: Naval Surface Weapons Center, Dahlgren, VA; RCA Corp., Burlington, MA. Field Artillery Rocket System: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA; Naval Ordnance Station, Indian Head, MD. Nuclear/Biological/Chemical Equipment: In-house: Marine Corps Development and Education Command, Quantico, VA., Naval Surface Weapons Center, Dahlgren, VA., U. S. Army Chemical Systems Laboratory, Aberdeen Proving Ground, MD. Contractor: TBD

Program Element: 63635M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: 8-Inch Laser-Homing Ordnance: Completed work on projectile baseline specification, warhead analysis and semi-active laser seeker evaluation. Evaluate guidance/control requirements. Marine Corps Ground Weaponry: Made effort to integrate Rationalization, Standardization and Interoperability, foreign development, and domestic capabilities into the development of ground combat systems. Joint Service Small Arms Program: Monitored/participated in the Squad Automatic Weapon Development Test/Operational Test IA testing, the Personal Defense Weapon evaluation, the Saboted Light Armor Penetrator concept feasibility modeling/testing and development of ammunition for the M-19 40MM machine gun. Artillery Direct Fire Sight: Established specifications and produced brassboard display. Conducted liaison with Naval Surface Weapons Center to determine technical requirements of program. Awarded hardware demonstration contract. Field Artillery Rocket System: This program was unfunded in FY 1981. It was in the exploratory development phase. System validation is being conducted. A feasibility demonstration has been accomplished. Test firings have been conducted. During FY 1981, fabrication of a prototype launcher was completed and evaluation of a range reduction device was initiated.

2. (U) FY 1982 Program: 8-Inch Laser-Homing Ordnance: Conduct of air-drop testing, gun firing, and static warhead testing will be performed. Marine Corps Ground Weaponry: Monitoring and testing of ground combat systems will continue. Joint Service Small Arms Program: Continue ongoing joint efforts to include product improvement of the M16A1 Rifle and MK-19 40MM machine gun. Continue development of Dover Devil Heavy Machine Gun and Saboted Light Armor Penetrator (SLAP). Artillery Direct Fire Sight: Transition to advanced development. Initiate shock hardening design and validate software. Field Artillery Rocket System: Continue test firings to evaluate prototype launcher and rocket compatability. Make modifications to launcher and complete fabrication of range reduction device. Transfer from exploratory development phase to advance development phase. Initiate development of range tables. Continue fuze design and test fuze/warhead compatability. Develop Integrated Logistics Support Plan.

3. (U) FY 1983 Planned Program: 8-Inch Laser-Homing Ordnance: Fabricate airframe hardware and assemble prototypes for Developmental Test I. Conduct all-up-round firings during Developmental Test I. Marine Corps Ground Weaponry: Monitor follow-on anti-tank weapons such as TOW/DRAGON replacements, and other ground weapons under development. Joint Service Small Arms Program: Continue joint small arms efforts. Artillery Direct Fire Sight: Continue advanced development to include conduct of environmental qualification. Field Artillery Rocket System: Complete launcher design. Develop range tables and complete fuze development. Prepare test and evaluation master plan. Continue training and logistics support. Nuclear/Biological/ Chemical Equipment: This is a new program start. Evaluate U.S. and foreign manufactured items of individual protective equipment, items of unit protective and decontamination equipment, including the UK Chemical Agent Monitor, the Norwegian Nuclear/Biological/Chemical-SANATOR lightweight decontamination apparatus, collective protection systems for shelters and a family of protective masks.

Program Element: 63635M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: 8-Inch Laser Homing Ordnance: Award of hardware contract for engineering development round and commence Development Test/Operational Test II. Marine Corps Ground Weaponry: Continue monitoring and testing of ground combat systems. Joint Service Small Arms Program: Continue joint small arms efforts. Artillery Direct Fire Sight: Complete advanced development. Field Artillery Rocket System: Procure Development Prototypes and conduct Demonstration/Operational Test I. Conduct In-Progress Review II. Procure production ammunition. Continue Integrated Logistics Support planning. Nuclear/Biological/Chemical Equipment: Continue evaluation of U.S. and foreign equipment.

5. (U) Program to Completion: 8-Inch Laser-Homing Ordnance: Complete Developmental and Operational Test II in early FY 1985. Marine Corps Ground Weaponry: This is a continuing program. Joint Service Small Arms Program: This is a continuing program. Artillery Direct Fire Sight: Enter full scale engineering and make production decision. Field Artillery Rocket System: Conduct Developmental/Operational Test II and In-Progress Review III. Nuclear/Biological/Chemical Equipment: This is a continuing program.

Program Element: 63635M
DoD Mission Area: 211 - Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Advanced)
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone	Date
Marine Crops Ground Weaponry	
1. Squad Automatic Weapon (SAW)	FY 1983
2. Product Improved M16A1 Rifle	FY 1983
3. Personal Defense Weapon (9mm Pistol)	FY 1984
4. M19 40mm Machine Gun	FY 1984
5. TOW II	FY 1983
Artillery Direct Fire Support Marine Corps IOC	
1. Transition to advanced development	FY 1982
2. Conduct Development and Operational Test I	FY 1982
3. Conduct Development and Operational Test II	FY 1983
4. Enter full-scale engineering development	FY 1984
5. Acquire procurement and production decision	FY 1985
6. Award production contract	FY 1985
7. Follow-on test and evaluation	FY 1986
8. Initial Operational Capability	FY 1986
8-Inch Laser Homing Ordnance	
1. MOU with Army for 8-Inch Ordnance	FY 1979
2. In-Progress Review	FY 1980
3. In-Progress Review	FY 1982
4. Developmental Test/Operational Test II	FY 1984
5. Developmental Test/Operational Test II	FY 1985
Field Artillery Rocket System	
1. Developmental Test/Operational Test I	FY 1983
2. In-Progress Review II	FY 1984
3. Developmental Test/Operational Test II	FY 1984
4. In-Progress Review III	FY 1985
5. Initial Operational Capability	FY 1987

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63691N
Title: MK 48 Advanced Capability (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	20,483	0	0	266,795 1/
S0311	MK 48 Advanced Capability (Advanced)	(83,871)1/	(91,922)1/	20,483	0	0	266,795 1/
	(Quantity - Advanced Development Models) 2/						(16) 2/

1/ Funded in Program Element 63562N (Submarine Tactical Warfare Systems (Advanced)) in FY 1982 and Prior Years. Concurrent Full Scale Engineering Devlopment is funded in project S0366 (MK 48 Advanced Capability (Engineering)). See the Descriptive Summaries for Program Elements 64562N (FY 1982 and prior years) and 64675N (FY 1983 and later).
2/ Development/Operational Test and Evaluation; procured prior to FY 1981.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program provides for the advanced development of the MK 48 Advanced Capability torpedo to counter the Soviet threat [redacted]

(U) *BASIS FOR FY 1983 RDT&E REQUEST:* *Continue in-water testing of Advanced Capabilities advanced development model torpedoes and propulsion upgrade subsystems. Fabrication of Advanced Capabilities torpedo engineering development models will be started. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.*

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). Although this Program Element does not exist in the FY 1982 budget, it is a continuation of funding shown in the FY 1982 Descriptive Summary for Program Element 63562N, project S0311. Changes in FY 1982 and prior estimates are shown in the Descriptive Summary for Program Element 63562N, Submarine Tactical Warfare Systems (Advanced). With respect to the FY 1982 Descriptive Summary for Program Element 63562N, the changes to project S0311 in FY 1983 and later are as follows: (1) The FY 1983 estimate has increased by 19,063 due to revision of all participating claimants (i.e., prime and subcontractor and in-house activities') estimates. (2) The total estimated cost of the MK 48 Advanced Capability Advanced Development Program has increased by 82,636 due to changes in the FY 1981 and 1982 funding shown in the Descriptive Summary for Program Element 63562N, project S0311 (+15,235 and +48,338, respectively) and the change in the FY 1983 estimate (change (1) above). (3) The number of advanced development torpedo modifications being procured for development/operational test and evaluation has been reduced from 24 to 16 as a cost control measure.

Program Element: 63691N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capability (Advanced)
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Reflected in the Descriptive Summary for Program Element 63562N in FY 1982.

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	52,617	68,636	43,584	1,420	0	184,159
S0311	Torpedo Advanced Development	52,617	68,636	43,584	1,420	0	184,159

(U) OTHER APPROPRIATION FUNDS: Reflected in Descriptive Summary for Program Element 64675N.

Program Element: 63691N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capability (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Recent and predicted advances in Soviet submarine design will reduce the effectiveness of the MK 48 Torpedo. [range and possibly red] This project will include improvements to the MK 48 guidance and control warhead exploder and propulsion and fuel tank subsystems to provide greatly enhanced acquisition, pursuit and homing performance against future threats. Procurement of twenty-four advanced development models was initiated in FY 1980 for Development Test and Evaluation and Initial Operational Test and Evaluation. The quantity has since been reduced to sixteen.

(U) RELATED ACTIVITIES: A concurrent full-scale engineering development program commenced in FY 1981 and is now funded under Program Element 64675N, project S0366, MK 48 Advanced Capability (Engineering)

(U) WORK PERFORMED BY: In-House: Naval Undersea Warfare Engineering Station, Keyport, WA. Contractors: Applied Research Laboratory, University of Texas, Austin, TX and Pennsylvania State University, State College, PA; Hughes Aircraft Corp., Fullerton, CA (Prime Contractor, MK 48 Advanced Capabilities Torpedo); Gould, Inc., Cleveland, OH; Westinghouse Electric Corp., Annapolis, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Computer simulation studies to define optimum torpedo acoustic system parameters were completed. Fabricated hardware for in water data collection and completed in water comparative target strength tests against [ ] Conducted design studies on evaluation targets. Completed Milestone I with Department of the Navy Systems Acquisition Review Council approval to proceed to validation phase (advanced development). Completed evaluation of the proposals and selected a validation phase contractor. Awarded prime contract for the Validation Phase. Began development of automatic test equipment concepts. Completed in-water testing of conceptual baseline guidance and control and warhead/exploder subsystems. Began design of torpedo hardware and software. Awarded a contract to upgrade propulsion and fuel subsystems for increased speed and depth. Began power and size reduction studies for Project S0366 Torpedo Engineering Development. Began preparation of specification for full scale engineering development model torpedo and automatic test equipment.

2. (U) FY 1982 Program: Commence delivery and in-water tests of Advanced Capability advanced development model torpedoes and propulsion upgrade subsystems. Continue concept development of the automatic test equipment for torpedo testing. Continue upgrade of real time simulator. Continue power and size reduction studies for engineering development models. Complete specifications for the engineering development model torpedo and start work on engineering development torpedo. Continue concurrent engineering development programs in Program Element 64675N, project S0366, Torpedo Engineering Development.

Program Element: 63691N
Title: MK 48 Advanced Capability (Advanced)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue in-water testing of Advanced Capability advanced development model torpedoes and propulsion upgrade subsystems. Start production of advanced capabilities engineering development model torpedoes and modified propulsion upgrade units. Start fabrication of the prototype system automatic test equipment. Continue concurrent engineering development in Program Element 64675N, project S0366, MK 48 Advanced Capability (Engineering).

4. (U) FY 1984 Planned Program: Program continues in Program Element 64675N.

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

6. (U) Milestones: See the Program Element Descriptive Summary for Program Element 64675N (MK 48 Advanced Capability (Engineering)).

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63702N
Title: Ocean Engineering Systems Development
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,327	3,099	2,320	2,257	Continuing	Continuing
S0394	Shallow Depth Diving Equipment	1,662	1,984	2,320	2,257	Continuing	Continuing
S1092	Deep Rescue Chamber System	1,665	1,115	0	0	0	2,780

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops Navy Ocean Engineering Systems which include: Navy diver equipment, underwater salvage and recovery systems, and advanced submarine rescue systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete development of passive diver thermal protection system and obtain approval for service use. Complete prototype development of standardized diving platform package. Continue development of general purpose diver's tools for use in shallow depths. Complete carbon dioxide absorption canister design. Complete development of modernized submarine rescue chamber. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: The increase of $475 in FY 1981 results from the reprogramming of $498 to project S1092 to compensate for increased costs and a reduction of $23 which occurred during development of the FY 1981 supplemental budget. The decrease of $92 in FY 1982 results from adjustments during development of the FY 1982 budget. The decrease of $60 in FY 1983 results from reduced escalation rates (-80) and pay increases (+9).

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,167	2,852	3,191	2,391	Continuing	Continuing
S0394	Shallow Depth Diving Equipment	1,167	1,676	2,061	2,391	Continuing	Continuing
S1092	Deep Rescue Chamber System	0	1,176	1,130	0	1,605	3,911

Program Element: 63702N
DoD Mission Area: 235 - Naval Warfare Support

Title: Ocean Engineering Systems Development
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN Ocean Engineering (Diving) (Various Equipment)	1,801	1,688	1,432	2,496	Continuing	Continuing

Program Element: 63702N
DoD Mission Area: 235 - Naval Warfare Support

Title: Ocean Engineering Systems Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Following the loss of the THRESHER in 1963, the Secretary of the Navy established the Deep Submergence Systems Review Group which examined Navy capabilities and projected needs for deep ocean search, rescue, and salvage. This review group recommended the following capabilities under development in this element: (a) Extended Salvage Depth Capability to develop the capability to recover small and large objects from depths to 20,000 feet -- develop one complete system for Operational Test and Evaluation; (b) Surface Supported Diving System (now called Shallow Depth Diving Equipment) to develop improved hardhat surface supported life-support diving equipment, lights, communications and life support equipment for conventional fleet diving operations to 400 foot depths; and (c) Deep Rescue Chamber - Replace existing 35-year old submarine rescue chambers with three new ones of improved design and handling system (air-transportable and useable with ships-of-opportunity).

(U) RELATED ACTIVITIES: Program Element 63713N, Ocean Engineering Technology Development, pursues efforts on buoyancy materials, electric/electronic equipment for underwater use, underwater power systems, hydraulic systems, and related/supporting efforts. The element also funds the development of deep-ocean diver tools/equipments and provides diver medical technology.

(U) WORK PERFORMED BY: In-House: Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Ocean Systems Center, San Diego, CA; Naval Coastal Systems Center, Panama City, FL; Navy Experimental Diving Unit, Panama City, FL. Contractors: United Technologies, East Hartford, CT; Lockheed, Sunnyvale, CA; Battelle Memorial Institute, Columbus, OH; General Electric Corporation, Philadelphia, PA; and Westinghouse Electric, Annapolis, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: (a) Fuel Cell Power System - Designed, fabricated, tested, delivered, and installed fuel cell in submersible DEEP QUEST. Fuel Cell technology is available for future Deep Submergence Rescue Vehicle application. (b) Extended Salvage Depth Capability - Completed design of 1/4 scale prototype lift pontoon and conducted 10,000 pounds per square inch hydrazine disassociation tests. Fabricated and tested 1/4 scale model lift system. Completed at sea tests of unmanned vehicle system equipped with underwater work and recovery system. Completed final report. (c) Surface Supported Diving System - started in FY 1973; prepared program plan and initiated design of Shallow Depth Diving Equipment. Designed, fabricated and tested new one-man recompression chambers; developed portable air (high pressure) supply system. Developed two-man diving bell; delivered and certified fleet operational. Completed Surface Supported Diving System MK 12 in air and mixed gas mode and obtained approval for service use. Completed diver life preserver development. Completed development of portable recompression chamber.

2. (U) FY 1982 Program: Complete prototype development of standardized diving boat module and prepare for service evaluation. Complete open ocean testing of diver's thermal protection suit. Complete development of Deep Rescue Chamber System. Initiate development of integrated surface supported diving system (EX 20). Initiate development of electrical safety devices for diver equipment. Complete development of diver acoustic communication system.

Program Element: 63702N
DoD Mission Area: 235 - Naval Warfare Support

Title: Ocean Engineering Systems Development
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Complete operational testing of standard diving boat module. Continue development of integrated surface supported diving system (EX 20). Continue development of electric safety devices for diver equipment. Complete development testing of carbon dioxide absorption canister. Initiate development of diver tool package.

4. (U) FY 1984 Planned Program: Complete approval for service use of standard diving platform package. Complete carbon dioxide absorption canister approval for Navy use. Continue development of integrated surface supported diving system (EX 20). Continue development of diver tool package. Continue development (test phase) of electric safety device.

5. (U) Program to Completion: Complete development of integrated surface supported diving system (EX 20). Complete development of diver tool package. Complete development of electric safety devices. This is a continuing program composed of changing projects.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Element: 63705N
sion Area: 235-Naval Warfare Support

Title: Logistics
Budget Activity: 4-Tactical Programs

SOURCES (PROJECT LISTING): (Dollars in Thousands)

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	6,788	12,215	3,339	1,844	Continuing	Continuing
Offshore Bulk Fuel System	1,890	3,373	2,316	1,095	Continuing	Continuing
Underway Replenishment	1,380	1,690	1,023	749	Continuing	Continuing
Sea Sheds	754	395	0	0	0	1,149
Merchant Ship Naval Augmentation Program	2,764	6,757	*			

erred to PE 63726N in FY 1983

IEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element develops advanced systems to unload and transfer fuel from cial tankers moored offshore and Navy Standard Underway Replenishment Equipment. Additionally, a system to convert ial containerships to carry outsize unit loads is being developed.

42 Offshore Bulk Fuel System fills a gap created by the retirement of Navy shallow draft tankers. Sustained amphibious fuel supply is now dependent on deep draft commercial tankers moored approximately two miles offshore. The current system ted to one mile offshore. The development includes (a) ship-transportable (less than 70 tons) and quickly installable point mooring buoys capable of expeditious tanker mooring, (b) high capacity and reliable explosive anchors and techniques lantation in various sea bottoms, (c) pumps and piping systems and (d) storage of petroleum products ashore with an afloat This system will be transportable by military and/or commercial ships to advanced areas and be compatible with the ed Navy and Marine Corps bulk fuel systems ashore.

398 Underway Replenishment includes the development of: (a) equipment for fueling-at-sea systems, (b) dry cargo shment-at-sea systems and (c) intra-ship handling systems such as winches, ram tensioners, sliding blocks, sliding padeyes, rop reels, special communications devices, and cargo and weapons elevators. This equipment will be for new ship ction with backfit in selected ships.

Program Element: 63705N
DOD Mission Area: 235-Naval Warfare Support

Title: Logistics
Budget Activity: 4-Tactical Programs

(U) S1554 Sea Sheds - Develop a system of removable between deck conversion framework modules with work through floors for containerships to provide them with the capability to carry outsize and heavy unit loads which cannot be containerized in standard containers.

(U) BASIS FOR FY 1983 RDT&E REQUEST: As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) Y0242 Offshore Bulk Fuel System - Conduct technical evaluation of the explosive embedment anchor. Prepare final documentation in support of Approval for Service Use for Offshore Bulk Fuel System components.

(U) S0398 Underway Replenishment - Continue development of Fueling-at-Sea equipment and Underway Replenishment communications devices, alternative winch drive, and standard elevator. Continue operational evaluation of sliding block and ram tensioner.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descripive Summary are as follows: Y0242 Offshore Bulk Fuel System - FY 1981 reduction of $16 and FY 1982 reduction of $48 result from refinement of cost estimates and adjustments for inflation. S0398 Underway Replenishment - FY 1981 reduction of $11 and FY 1982 reduction of $58 and FY 1983 increase of $412 result from refinement of cost estimates and adjustments for inflation. S1554 Sea Sheds - FY 1981 reduction of $46 and FY 1982 reduction of $5 result from refinement of cost estimates and adjustments for inflation. S0378 Merchant Ship Naval Augmentation Program - FY 1981 increase of $9 and FY 1982 reduction of $102 result from refinement in cost estimates and adjustments for inflation.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,015	6,852	12,428	8,879	Continuing	Continuing
Y0242	Offshore Bulk Fuel System	3,175	1,906	3,421	2,316	Continuing	Continuing
S0398	Underway Replenishment	1,840	1,391	1,748	611	Continuing	Continuing
S1554	Sea Sheds	0	800	400	0	0	1,200
S0378	Merchant Ship Naval Augmentation Program	0	2,755	6,859	5,952	Continuing	Continuing

Program Element: 63705N
DOD Mission Area: 235-Naval Warfare Support

Title: Logistics
Budget Activity: 4-Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN (Procurement)						
Offshore Bulk Fuel System	0	0	1,300	0	62,196	63,496
Underway Replenishment	3,593	10,269	7,765	3,085	Continuing	Continuing
Sea Sheds			10,000	10,000	88,000	108,000

Program Element: 63705N
DOD Mission Area: 235-Naval Warfare Support

Title: Logistics
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Offshore Bulk Fuel System provides for the development of an offshore tanker mooring and associated equipment capable of providing the type and quantity (approximately 1 million gallons per day) of fuel required by a Marine Amphibious Force during amphibious assault. This system is the link between modern deep draft commercial and Military Sealift Command tankers offshore and Marine Corps fuel distribution units on the beach. The Underway Replenishment project provides for the continuing Advanced Development of specialized equipment required to replenish surface ships at sea with fuel, ammunition, food and supplies vital to maintaining the Fleet at sea. The equipment developed will provide standardized machinery components which are inherently more reliable, maintainable, and resistant to the rigors of the sea environment. The Sea Sheds project will provide containerships the capability to carry outsized loads and heavy unit loads which cannot be containerized.

(U) RELATED ACTIVITIES: Container Offloading and Transfer System - PE 63719N; USMC Field Logistic System, PE 63635M; Exploratory Development on Navy/Marine Corps Amphibious and Advanced Base Petroleum, Oil and Lubricants System (1975-1990) in PE 62760N, Logistics Technology.

(U) WORK PERFORMED BY: In-House: Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Ship Weapons System Engineering Station, Port Hueneme, CA; Naval Ocean Systems Center, San Diego, CA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ordnance Station, Indian Head, MD; Naval Coastal Systems Center, Panama City, FL; Naval Sea Systems Command, Washington, DC; Naval Weapons Handling Center, Earle, NJ; Naval Ship Systems Engineering Station, Philadelphia, PA; Norfolk Naval Shipyard, Portsmouth, VA. Contractors: IMODCO, Los Angeles, CA; Dunlop Ltd., U.K.; Energy Analysis Inc., Norman, OK.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Offshore Bulk Fuel System project has established criteria and explored concepts and technology associated with providing large volumes of fuel to the beach from a minimum of two miles offshore during amphibious operations. Conducted on-land, at-sea and cold weather tests of fuel storage bladders; completed final design of the single point mooring buoy; and completed a competitive test between steel and fiberglass reinforced plastic pipe, resulting in the choice of steel pipe to continue development. Conducted engineering validation tests of two components of the system: The Amphibious Tanker Terminal Facility, which includes the single point mooring buoy, and the Amphibious Assault Fuel Supply Facility. Tested exposive embedment anchors for both components. Conducted shelf-life test of flexible fuel storage bladders. Conducted technical evaluation of the Amphibious Tanker Terminal Facility. Initiated Approval for Service Use documentation. The Underway Replenishment project has delivered saddle and hauling winches, standard padeyes, cargo drop reels, anti-slack devices and fueling probes to the Fleet. Designed, built and tested at-sea the standard highline/spanwire and hauling winches, saddle winch, and anti-slack device. Designed and built variable speed electric drives. Designed an engineering development model of a multi-channel communications device. Designed standard elevators components. Bids have been received for the procurement of four sea sheds and test support for at-sea evaluation.

Program Element: 63705N
DOD Mission Area: 235-Naval Warfare Support

Title: Logistics
Budget Activity: 4-Tactical Programs

2. (U) FY 1982 Program:

(U) Y0242 Offshore Bulk Fuel System: Conduct operational evaluation of the Amphibious Tanker Terminal Facility using high capacity drag embedment anchors. Conduct technical and operational evaluation of the Amphibious Assault Fuel Supply Facility. Initiate documents in support of system procurement. Prepare final documents required for Approval for Service Use for fuel transfer components.

(U) S0398 Underway Replenishment: Shore test alternatives to standard hydraulic transmissions. Sea-test prototype highline and spanwire winches, sliding blocks and ram tensioners. Build and test prototype multi-channel wire-free comunications device. Complete standard elevator detailed design.

(U) S1554 Sea Sheds: Conduct shore and at-sea evaluation of ships-installed sheds using actual military cargo. Shed structure will be instrumented to obtain stress and strain data. Project will be completed at end of sea-test.

3. (U) FY 1983 Planned Program:

(U) Y0242 Offshore Bulk Fuel System: Conduct technical evaluation of explosive embedment anchor. Upon receipt of Approval for Service Use commence production of the fuel transfer components.

(U) S0398 Underway Replenishment: Complete Operational Evaluation of winches, ram tensioners and sliding blocks. Prepare final data for winches, rams and sliding blocks. Continue fueling-at-sea equipment, alternative winch elevator drive and prototype communications device.

4. (U) FY 1984 Planned Program:

(U) S0398 Underway Replenishment: Continue development of elevator drive and start Technical and Operational Evaluations. Complete alternative winch drive and ram tensioner sea tests. Continue fueling-at-sea equipment development.

(U) Y0242 Offshore Bulk Fuel System: Conduct Follow-on Test and Evaluation of the explosive embedment anchor. Prepare documentation for Approval for Service Use. Complete development program in FY 1984.

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

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63708N
Title: Anti-Submarine Warfare Signal Processing
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	10,138	7,626	5,202	6,546	Continuing	Continuing
S0821	Advanced Acoustic Processing	6,791	3,954	6,791	1,957	Continuing	Continuing
S0823	Acoustic Performance Prediction	3,347	3,672	3,277	4,589	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Advanced Acoustic Processing project will independently evaluate Anti-Submarine Warfare (ASW) signal processing systems aboard tactical air, surface and subsurface platforms. This evaluation will be used to reduce duplicative effort and permit technology transfer among advanced development platform-related signal proocessing programs. [redacted] is also funded under Advanced Acoustic Processing. Acoustic Performance Prediction will develop an on-board capability to provide acoustic performance predictions [redacted] Such a software capability will be needed as ASW sensor and weapon systems become more complex since their tactical applications are based on knowledge of acoustic environmental conditions.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Contracts will be awarded for testing of various surface, submarine and aircraft signal processing and post-processing systems currently being developed. Development and at-sea testing of comprehensive Acoustic Performance Prediction packages for each platform will continue and initial software packages will be provided to host systems for integration; in addition, near term platform products will be provided to the fleet (implemented on existing systems) for use and evaluation. The decreases in FY 1983 funding from FY 1982 is due to completion [redacted] and a reduction of scope in S0823. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: the decrease of $1147 for S0821, Advanced Acoustic Processing, in FY 1981 is a result of cost savings and the decreases of $3,102 in FY 1982 and $5,226 in FY 1983 [redacted]

Program Element: 63708N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Signal Processing
Budget Activity: 4 - Tactical Programs

The decrease for S0823, Acoustic Performance Prediction of $54 in FY 1981 and $151 in FY 1982 are the result of refined estimates for escalation. The decrease of $781 in S0823 in FY 1983 reflects a change in scope of the program.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,860	11,339	10,879	11,209	Continuing	Continuing
S0821	Advanced Acoustic Processing	4,439	7,938	7,056	7,151	Continuing	Continuing
S0823	Acoustic Performance Prediction	4,421	3,401	3,823	4,058	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63708N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Signal Processing
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program will develop Anti-Submarine Warfare (ASW) signal processing systems to aid in processing acoustic data in ASW systems aboard tactical air, surface, and submarine platforms. The systems to be developed will use standard signal processing and display hardware. The computer software will provide common algorithms and a mutual technology evaluation capability for all tactical ASW programs. The signal processing system developments will be tailored to satisfy the requirements of the specific user ASW systems. This program currently contains two distinct projects for development of new ASW signal processing systems: Advanced Acoustic Processing (Project S0821) and Acoustic Performance Prediction (Project S0823). S0821, Advanced Acoustic Processing: This project will validate ASW signal processing systems to aid in processing acoustic data in ASW systems aboard tactical air, surface and submarine platforms. The signal processing and post processing developments will be tailored to satisfy the generic requirements of the ASW user systems.

The result will be an order of magnitude increase in the amount of data requiring operator processing; however, a corresponding increase in display space or in the number of skilled operators is not feasible. An Automated Detection/Computer Aided Classification capability is required to alleviate these problems. This project will evaluate operator performance signal and post processing systems for detection, classification and localization, using calibrated acoustic data sets. Efficient operator interaction with the hybrid hardware/software acoustic sensor system will be developed so that a less skilled operator assisted by the computer is able to perform as well as an experienced operator.

S0823, Acoustic Performance Prediction:

It is increasingly important that we understand and take advantage of system performance anomalies which are due to the effects of the natural environment. To achieve the full performance of our undersea sensor and weapon systems, operators and commanders must be provided with accurate, real-time estimates of undersea warfare systems performance based on local conditions. System complexity requires the use of these predictions to select optimum operating modes and ASW system/suite lineup and to evaluate various employment alternatives. This requirement will be met by an onboard Acoustic Performance Prediction system for ASW surface ships (including carriers), submarines and ASW Operations Centers. Implementation of Acoustic Performance Prediction software onboard ASW aircraft is also being considered. Acoustic Performance Prediction software will be tailored to the specific needs of the operational user. The software will utilize measured acoustic/environmental data, supplemented by historical data, and undersea warfare system/target characteristics to yield system and suite performance predictions. Comprehensive Acoustic Performance Prediction packages will be available beginning in 1984. Selected software is being provided for fleet use in the near term using available hardware.

(U) RELATED ACTIVITIES: Program Elements 24311N, Undersea Surveillance System; 64261N, Acoustic Search Sensors; 64503N, Submarine Sonar Development; 64219N, Airborne ASW Developments; 64713N, Tactical Towed Array Sonar; 24313N, Surveillance Towed Array Sensor;

Program Element: 63708N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Signal Processing
Budget Activity: 4 - Tactical Programs

63788N, Rapidly Deployable Surveillance System - development of advanced acoustic processing capabilities for various air, surface, submarine, and surveillance platform applications. Program Element 63785N, Long Range Acoustic Propagation provides basic environmental acoustic and system performance models. Carrier and ASW Operational Center acoustic prediction software will be implemented in the Tactical Environmental Support System, Program Element 63207N.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Air Test Center, Patuxent River, MD; Naval Surface Weapons Center, White Oak, Silver Spring, MD: Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, New London, CT; Naval Underwater Systems Center, Newport, RI; Naval Ocean Research and Development Activity, Bay St. Louis, MS; Naval Oceanographic Office, Bay St. Louis, MS. Contractors: Lockheed California Company, Burbank, CA; TRW Systems, McLean, VA; Bell Telephone Laboratories, Whippany, NJ; Analysis and Technology Inc., North Stonington, CT; Analytic Disciplines Inc; Vienna, VA; General Electric Co., Syracuse, NY; The Energystics Corporation of Virginia, Arlington, VA; General Physics Corporation, Columbia, MD and Applied Research Laboratory, Penn State University, State College, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (V) FY 1981 and Prior Accomplishments: S0821, Advanced Acoustic Processing: The project was initiated during the second quarter of FY 1977. A contract was awarded to quantify computer aided detection and classification system performance under controlled conditions. Applicability of these evaluated techniques to airborne platforms was investigated. Specific performance objectives for each Automatic Detection/Computer Aided Classification system development have been established. A facility to provide standardized acoustic test tapes for dependent validation of Automatic Detection/Computer Aided Classification algorithms has been established at Naval Surface Weapons Center. Naval Surface Weapons Center was designated as the lead laboratory in 1980. Validation testing of operational P-3C aircraft Automatic Detection/Computer Aided Classification systems identified several software deficiencies and the necessary corrections have been completed. Tests of the corrected systems have demonstrated a significant capability in the detection and classification process. Baseline performance of the S-3A was established during testing and an evaluation of baseline performance of the P-3B/C was completed. Valuable lessons have been learned from these initial tests which can be applied to all Automatic Detection/Computer Aided Classification system development and are being consolidated for publication. Development testing of Surface and Submarine Automatic Detection/Computer Aided Classification systems commenced in FY 1981. S0823, Acoustic Performance Prediction: Initial program emphasis was on the definition of user requirements. A description of performance prediction software routines was prepared. Based on an analysis of the most effective method of providing this capability to fleet users, a decision was made to implement acoustic performance prediction software in existing or already planned computers. Interim Acoustic Performance Prediction software for all platforms has been implemented in existing minicomputers and desk top calculators. A survey of existing acoustic models, environmental data bases, and Acoustic Performance Prediction related software was completed.

Program Element: 63708N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Signal Processing
Budget Activity: 4 - Tactical Programs

Operational specifications for surface ship, submarine and air applications were completed. A rigorous evaluation of competing propagation loss models was completed. The form and content of the data base have been defined and the data base is being constructed. An in situ background noise/reverberation monitor has been developed and tested. Development, evaluation and sea testing of long term software is underway.

2. (U) FY 1982 Program: S0821, Advanced Acoustic Processing: Contracts will be awarded for additional quantification and evaluation of tactical surface and submarine detection and classification systems. These results will be coordinated to permit decisions on the merit of alternative techniques. Successful techniques will be presented to other platforms. S0823, Acoustic Performance Prediction - Continued development and laboratory/sea testing of long term software packages for each platform type. A major sea test of the Surface Ship Acoustic Performance Prediction advanced development model will be conducted. Emphasis will shift to the development of system prediction models. Environmental model evaluation will continue. Development of a unified Acoustic Performance Prediction data base will be completed. Improved near-term software will be provided for all platforms. Advanced development models of prediction systems for implementation on surface and air platforms will be developed.

3. (U) FY 1983 Planned Program: S0821, Advanced Acoustic Processing: Validation of Automated Detection/Computer Aided Classification algorithms will continue for surface, submarine, and improved airborne Automated Detection/Computer Aided Classification systems. Upon completion, algorithms will be certified for incorporation in operational software for air, submarine and surface ship platforms. S0823, Acoustic Performance Prediction: Development and laboratory/sea testing of comprehensive Acoustic Performance Prediction platform package will be conducted. Emphasis will be on updating/improving existing software based upon changing tactics and improved modeling technology/data bases. Development of weapon and acoustic communication system prediction will commence. The provision of Acoustic Performance Prediction software for integration in host system will continue. Evaluation and update of near term operational software will continue as required.

4. (U) FY 1984 Planned Program: S0821, Advanced Acoustic Processing: Continue validation testing of all tactical ASW platforms. Support required system modifications that are identified by validation testing and their incorporation in operational software for air, submarine, and surface ship platforms. S0823, Acoustic Performance Prediction: Development and testing of comprehensive Acoustic Performance Prediction platform packages will continue. Emphasis will be on at-sea evaluation of system prediction software and updating/improving existing software based upon changing tactics and improved modeling technology/data bases. Integration of Acoustic Performance Prediction software into the host platform software will commence. Evaluation and update of near term operational software will continue as required.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63711N
DoD Mission Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation Program
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,661	3,896	4,551	6,678	Continuing	Continuing
R0138	Tactical Development Support	3,661	3,896	4,551	6,678	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Encompasses the Navy's major system for standardized collection of fleet operational data elements and for analysis/reconstruction of exercise and real-world operational events, and provides a central library for tactical information and doctrine.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To provide funds for prototype development, enhancement and evaluation of automatic data collection devices. The Fleet Tactical Development and Evaluation Master Plan identifies over 800 tactical deficiencies. Fleet commands develop projects aimed at solving these deficiencies. Gathering data on exercises/operational events for analysis and reconstruction is man hour intensive and deters personnel from performing their primary duties. Utilization of automatic devices results in more accurate data being gathered and permits personnel to perform their assigned operational duties with minimal distractions. Finally, analysis of the gathered data provides the basis for the development of new and/or improved tactics for the Navy (i.e. single ship to Battle Group). An expansion of the present automatic data devices program is necessary due to the shortage of skilled Navy personnel. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The change between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: +$120 in FY 1981 was due to inflation; -$1,071 in FY 1982 and -$1,827 in FY 1983 were due to the reductions in connection with the overall downward Navy budget adjustments to the FY 1982/1983 budget request. These reductions will cause delivery to the Fleet of the Automatic Data Collection Devices to be slowed down and spread over a longer period of time.

Program Element: 63711N
DoD Mission Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation Program
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,146	3,541	4,967	6,378	Continuing	Continuing
R0138	Tactical Development Support	3,146	3,541	4,967	6,378	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 63711N
DoD Mission Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project was initiated in FY 1966. It encompasses the Navy's major system for standardized collection of fleet operational data elements, exercise analysis and real-world operational analysis and reconstruction. Additionally, it provides a central library for tactical information and doctrinal publications. This effort was initiated in the Anti-Submarine Warfare area and was later expanded to encompass all warfare areas. The reconstruction programs (Fleet Automatic Reconstruction and Opportunity Evaluation System and Mini Reconstruction System) are coordinated with fleet personnel engaged in tactical projects within the Tactical Development and Evaluation program. This project provides the fleet with a significant capability to analyze exercises and operations allowing a determination of performance trends and providing a basis for evaluation of tactics, command support systems, weapons systems and training, to promote better tactics, training, and faster long range planning. It replaces the ad hoc, fragmented and predominately manual methods of reconstruction and includes automatic data collection devices, mini-reconstruction systems and their accompanying programs. This allows more accurate data collection, reduces shipboard manual data collection efforts, and enables analysts to devote their time to the analysis process instead of the manual processing of raw data, as has been done previously.

(U) RELATED ACTIVITIES: This work is coordinated with Navy laboratory programs and equipment, and Naval Material Command project managers with equipment and software installed on fleet units and at fleet accessible major computer centers. This project is extremely important in order to reduce the effort required for data collection and processing. With this equipment, the efforts of both ship and support personnel can be devoted to the process of assessing tactical capability in the fleet leading to the ultimate goal of improving fleet tactical capability. Equipments and software developed under this program support the effort in tactical development and evaluation conducted under Program Element 65155N, Fleet Tactical Development and Evaluation Program.

(U) WORK PERFORMED BY: In-House: Office of Naval Research, Arlington, VA; Naval Underwater Systems Center, Newport, RI; and New London, CT; Naval Weapons Center, China Lake, CA; Fleet Analysis Center, Corona, CA; Naval Ocean Systems Center, San Diego, CA; Director of Navy Laboratories, Arlington, VA. Contractors: Teledyne Brown Inc., Hunstville, AL; Tetra Tech, Inc., Pasadena, CA; and Applied Physics Laboratory, Columbia, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Standard definitions for tactical warfare analysis data elements and operational data forms were designed and promulgated for the reconstruction of fleet exercises involving air, surface, subsurface, and fixed platforms and sensors. The single ship, multiship, and opportunity evaluation subsystems of the Fleet Automatic Reconstruction and Opportunity Evaluation System have been developed and installed on fleet accessible computers as well as those at Navy laboratories. The reconstruction correlation subsystem of the Fleet Analysis and Reconstruction of Exercises program was developed for Navy Tactical Data System equipped ships and had been installed on several DLG's for test and evaluation. Automatic track recorders to record course, speed and time were developed and are now being utilized for automatic vice manual data extraction for reconstruction and analysis purposes. The procedures for establishing a central library source for all tactically

related documents were formulated and promulgated. An automated document retrieval system for rapid extraction of tactical documents was established to provide rapid response to fleet activities requesting tactical research assistance. The basic requirements for an at-sea and a shore-based reconstruction capability were established and equipment and software specifications were solicited from all participating activities. The Fleet Automatic Reconstruction and Opportunity Evaluation System program was expanded to provide tabular summary data for reconstructed events. The Fleet Tactical Library was established for the receipt and distribution of tactical documents. An information processing program was developed to incorporate Anti-Submarine Warfare aircraft data directly from the P-3C Tactical Support Center into the Fleet Automatic Reconstruction and Opportunity Evaluation System program for reconstruction. An automatic satellite navigation recorder and a portable semi-automatic data recorder were prototyped, tested, and are being utilized as an exercise reconstruction aid providing consistent high quality position and track data. The tactical support project continued to develop automatic data collection equipment in order to more accurately appraise performance and to reduce required manpower for evaluation. Specifications for automatic collection units comprised of small, inexpensive, multi-purpose units, suitable for collection of more than one type of data element were developed. A mini at-sea reconstruction system based on a programmable calculator was developed and tested, using off-the-shelf equipment with state-of-the-art technology incorporated. The Fleet Mission Program Library was established to provide a centralized activity in support of tactical development for use in programmable calculators by fleet personnel.

2. (U) FY 1982 Program: Data collection requirements and operational data forms will continue to be updated/specified to provide reconstruction standardization in all warfare activities. The Mini Shipboard Automatic Recorder System prototype will continue to be evaluated during fleet exercises and operations to assess operational implementation and employment procedures. The Tactical Reconstruction Information Pod prototypes will be employed operationally in support of exercises. The Tactical Information Management System Mini Reconstruction System will be employed in support of all numbered fleet exercises for analysis of exercise data. The Fleet Mission Program Library will be expanded to include tactical decision aids for Battle Group and Warfare Commanders. The Fleet Tactical Library will develop a system to permit evaluation of tactical deficiencies by fleet personnel as well as providing tactical information to requesting fleet commands in support of the Tactical Development and Evaluation Program.

3. (U) FY 1983 Planned Program: The tactical support project will expand the design of the Mini Shipboard Automatic Recorder System to include planned operations in a submarine environment. Tactical Reconstruction Information Pod, with design improvements, is an airborne data collection system encased in an aircraft wing mounted pod that will continue to be used and be evaluated in fleet exercises. A Performance Assessment System prototype will be enhanced to evaluate surface ship performances in specific warfare mission areas. The Data Translation System wil' be evaluated during fleet exercises using data extracted from shipboard Navy Tactical Data System and P-3C systems. The Mini Reconstruction System, that is compatible with automatic recording devices, will be designed to accept inputs from the data translation system and new data collection devices. The Fleet Mission Program Library will continue to support tactical software program development and be expanded to include mine warfare tactics. The Fleet Tactical Library will continue the receipt and distribution of tactical documents. A tactical information system using

Element: 63711N
sion Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation Program
Budget Activity: 4 - Tactical Programs

ni Reconstruction System hardware will be updated to provide fleet commanders with the ability to rapidly recall information ie most current exercises and operational events. This will enable fleet personnel to implement effective exercise planning e identification of tactical deficiencies.

FY 1984 Planned Program: Initiate planning of methods to improve the communication and transfer of tactical doctrine ation to fleet personnel in the combat environment. Continue the advanced development of the enhanced Mini Shipboard tic Recorder System and Tactical Reconstruction Information Pod data collection software programs to expand the automatic ollection capability for assessment of tactical opportunities. Initiate necessary development efforts for the integration i Shipboard Automatic Recorder System to submarine combat direction systems and aircraft tactical support center systems to insure that extremely accurate sequence of reconstruction events/data can be achieved. Configuration control coordination ctical information management systems will continue to be maintained by the project to ensure a coordinated phased pment. Continue fleet assessment of the Mini Shipboard Automatic Recorder System, Tactical Reconstruction Information Pod, ni Reconstruction System in the at-sea exercise environment for verification of system interoperability. The Fleet Tactical will continue to review tactical documents and ensure more timely response to fleet information requests.

Program to Completion: This is a continuing program.

Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63717N
Title: Command and Control Systems (Advanced)
DoD Mission Area: 353 - Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	10,452	8,780	24,106	20,327	Continuing	Continuing
X0709	Navy Command and Control System Afloat	10,452	8,780	11,379	6,172	Continuing	Continuing
X0798	Over-the-Horizon Targeting	*	*	11,675	11,270	Continuing	Continuing
Z1573	Electromagnetic Pulse Survivability of Navy Command and Control Systems	-	-	1,052	2,885	Continuing	Continuing

* Funded under Program Element 63530N.

(U) DESCRIPTION OF ELEMENT AND MISSION NEED: The Navy Advanced Command and Control program development will consist of three projects in FY 1983. The principal project, X0709 Navy Command and Control System Afloat, has been ongoing since 1974. Project X0798, Over-the-Horizon Targeting, has been an ongoing project under Program Element 63530N prior to FY 1983. Project Z1573, Electromagnetic Pulse Survivability of Navy Command and Control Systems is a new start. Project X0709 will provide for tactical situation display of both shore and organic surveillance information, software planning aids for tactical decision-making, access to supporting communications, promulgation of threat information and coordination of forces. The addition of the over-the-horizon targeting R&D effort (Project X0798) will explore and determine the best methods to maximize existing organic sensors combined with all source ocean surveillance to enhance the battle groups' capability to employ long range weapon systems. Project Z1573 will survey Tactical Navy Command and Control and assess survivability from nuclear electromagnetic pulses from high altitude nuclear detonations. The project will develop detailed electromagnetic pulse hardening plans for critical Navy Command and Control nodes. The project will further develop prototype hardening items and the instrumentation to measure hardening. The project will concentrate on tactical aspects of Navy force communications survivability but will incorporate the lessons learned from strategic studies.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project X0709: Install redesigned baseline prototype on USS AMERICA and Large Screen Display at the Land Based Prototype. Commence shore operational evaluation and follow-on operational test and evaluation at Land Based Prototype. Continue system design for Increment three Tactical Flag Command Center. The increase of 2,599 in FY 1983 is a result of program redirection calling for procurement of two prototype Flag Data Display Systems and development of the large screen displays. Project X0798: Support TOMAHAWK test firings and fleet over-the-horizon targeting exercises through maintenance of AN/USQ-81(V) Tactical Data Display System. Provide over-the-horizon targeting support to surface launched anti-ship TOMAHAWK

Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

as the system achieves initial operational capability. Continue engineering analysis of fleet over-the-horizon targeting exercises and demonstrations. Continue development of an improved over-the-horizon targeting capability for P-3B/C aircraft and other selected air platforms capable of employing HARPOON. Continue over-the-horizon targeting communications development involving multiple paths for computer-to-computer communications. Continue integration of over-the-horizon targeting capability improvements into Navy Command and Control System. Support Command and Control/over-the-horizon targeting tactical data display systems at land based test sites. Conduct advanced concept research in selected areas to improve battle damage assessment, over-the-horizon targeting net connectivity, etc. Continue development of an over-the-horizon targeting system for ships fitted with HARPOON. Commence efforts to improve individual surface ship over-the-horizon targeting capability through fleet demonstrations of surface acoustic targets. Project Z1573: Commence analysis of Electromagnetic Pulse hardening requirements for critical Navy Command and Control nodes. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). Project X0709: The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary consists of an increase in FY 1981 of 1,600 which is the result of reprogramming action done in conjunction with the baseline redefinition. The increase of 4,819 in FY 1983 is a result of major program redirection calling for the procurement of two prototype Flag Data Display Systems and the commencement of studies to utilize higher-order language software. Also, this increase supports software improvements and the introduction of software for the large screen display. The small decrease in FY 1982 is due to revised inflation indices. Project X0798: This project was funded in Program Element 63530N in FY 1982 and is new to this element in FY 1983. Project Z1573 is a new start in the FY 1983 Descriptive Summary.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,658	8,852	8,951	6,560	Continuing	Continuing
X0709	Navy Command and Control System Afloat	3,658	8,852	8,951	6,560	Continuing	Continuing

Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN Funds	1,600	16,149	23,379	3,947	2,954	48,029
Quantity (Shipboard Equipment Increment 1)	(6)	(7)	(6)	-	-	(19)
Quantity (Processing System)		(4)	(2)	-	-	(6)
Quantity (Display Subsystem)			(6)	-	-	(6)
Quantity (Increment III Conversion)				(7)	(6)	(13)
O&MN Funds	700	2,783	10,206	9,679	8,913	32,281

Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project X0709: The Tactical Flag Command Center is the battle station for the officer in tactical command. The Tactical Flag Command Center will support the tactical commander in his decision making process by receiving and displaying information relative to the current tactical situation. In August 1979, the Chief of Naval Operations approved the use of an incremental/evolutionary approach for the Tactical Flag Command Center. A plan for accelerated deployment of the baseline system was approved by the CNO in March 1980. The Tactical Flag Command Center was given a rapid Development Capability designation by the Assistant Secretary of the Navy (Manpower, Reserve Affairs and Logistics) and the Assistant Secretary of the Navy (Research, Engineering and Systems) in July 1980. The Chief of Naval Operations tasked Chief of Naval Material to define an improved baseline in November 1980. The improved baseline system is defined as follows: Increment one is the establishment of the command center spaces equipped with extension of existing flagship capabilities such as the Navy Tactical Data System consoles and access to communications. It provides an austere essential command center capability and stands alone as a requirement. Increment two is described as four blocks. Block A is core advanced data processing system and 1 terminal; Block B is a set of additional operator terminals; Block C is a communications package providing access to satellite transmission and selected Navy Tactical Data System data; and Block D is a large screen display group. Limited procurement of the Flag Data Display System was approved by the CNO in November 1981. Increment three will provide improvements to the Flag Data Display System through software enhancements. These will be developed in an evolutionary manner based on lessons from deployed systems and through the application of enhanced technology. Project X0798, Over-the-Horizon Targeting, is an R&D effort designed to explore and determine the optimal methods of conducting over-the-horizon targeting by maximizing the use of existing and programmed sensors, fire control systems, command and control supporting systems, and communications systems. The method to accomplish the program objectives or capability to target hostile naval units from over-the-horizon consists of three phases which include concept definition, fleet demonstrations, and a capability assessment. The results of the R&D efforts are used as the basis for over-the-horizon targeting improvements to the Navy Command and Control system. Equipment procurements/system changes to implement improvements are then initiated by the appropriate program sponsors. Installation schedules for programmed systems are as follows:

OVER-THE-HORIZON TARGETING SYSTEMS

	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90
Shore Targeting Terminals (Submarine Force Commanders)	2	2									
Combat Control System MKI (Submarine - 637/688 Class)			1	6	8	10	11	10	8	7	9
Common Weapons Control System			2	1	6	7	7	4	3		
Ocean Surveillance Information System Sites *	5										

* Ocean Surveillance Information System baseline over-the-horizon targeting related software upgrades.

Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

Project Z1573: This project is an FY 1983 new start to systematically survey tactical Navy command and control for survivability from nuclear electromagnetic pulses. Electromagnetic pulse hardening requirements and efforts for strategic communications are considered to avoid duplication. Planned products include: detailed design requirements and costs for electromagnetic pulse hardening of critical Navy Command and Control nodes; a uniform design methodology to incorporate cost-effective electromagnetic pulse hardening in new systems; standards, specifications, and qualification of electromagnetic pulse protection hardware for Navy use and stocking; and design criteria and instrumentation to measure electromagnetic pulse hardness of Navy Command and Control equipment, especially at the subsystem level during production as well as during use. Project efforts are fully coordinated with the Defense Nuclear Agency.

(U) RELATED ACTIVITIES: Program Element 64711N, Project X1144, Navy Command and Control System Shore Node, Program Element 64367N, Project X0545, TOMAHAWK Missile System and Program Element 24660N, Navy Command and Control Systems.

(U) WORK PERFORMED BY: In House: Naval Ocean Systems Center, San Diego, CA; Naval Electronics Systems Engineering Center, Portsmouth, VA; Naval Electronic Systems Activity, St. Inigoes, MD. Contractors: Lockheed Missile and Space Company, Inc., Sunnyvale, CA; Science Applications, Inc., Arlington, VA; Vitro Laboratories, Silver Spring, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project X0709: The accelerated Flag Data Display System is a derivative of the existing AN/USQ-81(V) which has undergone extensive testing as part of the over-the-horizon/detection, classification, and targeting project. Flag Data Display System development models (modified AN/USQ-81(V)'s) have been installed on USS MIDWAY and USS AMERICA. Established Tactical Flag Command Center mock-up and fleet visit program. Established land based prototype at Naval Ocean Systems Center, San Diego, Ca, which is presently operational with an engineering development model (modified AN/USQ-81(V)). A formal test phase has been completed in conjunction with USS MIDWAY operations in the Indian Ocean. An operational test involving both ships was completed in September 1981. Project X0798 commenced in FY 1977. The initial thrust of the program has been to develop an over-the-horizon targeting capability to support anti-ship TOMAHAWK employment. A concept definition analysis effort based on operational demonstrations has produced specifications from which a long term over-the-horizon targeting capability is evolving. Requirements to develop shipboard and shore support systems to satisfy TOMAHAWK and HARPOON targeting needs have been established. These requirements have been translated into equipment and software designs based on capabilities inherent within existing AN/USQ-81(V) developmental systems. Operational systems resulting from these efforts include: Common Weapons Control System, Combat Control System MKI, Tactical Flag Command Center, Shore Targeting Terminals, and Ocean Surveillance Information System Site Over-the-Horizon Targeting interfaces. The program has also supported anti-ship TOMAHAWK development and testing, communications development, and system engineering and analysis.

Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Project X0709: Complete hardware procurement and software testing for baseline system. Prepare specification for large screen display. Commence Flag Data Display System technical evaluation at Land Based Prototype. Complete Increment one battle space ship alteration on USS AMERICA (operational evaluation platform). Continue mock-up demonstration and fleet visits at prototype to aid in evolutionary development. Conduct Command and Control architectural study and begin system design for Increment three Tactical Flag Command Center. Procure four Increment two Flag Data Display Systems Blocks A, B, C for software support agency, team/operator trainer and two platforms. (Limited procurement based on authority to procure in advance of approval for service use. Planned installation of Flag Data Display System is the fourth quarter FY 1982. Project X0798 will support TOMAHAWK Anti-Ship and Land Attack Missile operational evaluation of over-the-horizon targeting requirement. Block improvements to Navy Command and Control systems will be accomplished. Development of an over-the-horizon targeting capability for HARPOON equipped P-3 aircraft will be initiated. Communications connectivity interface specifications will be developed and promulgated. Improvements to targeting software and decision aid development will be accomplished.

3. (U) FY 1983 Planned Program: Project X0709: Install Increment two (Block D) at land based prototype with shore operational evaluation commencing mid-FY 1983 and fleet operational test and evaluation late FY 1983. Install Flag Data Display System aboard USS AMERICA (operational evaluation platform). Continue system design for Increment three Tactical Flag Command Center. Install increment one on five carriers and Increment two (Flag Data Display System) on two carriers. Procure seven Increment one's and six Increment two's (Flag Data Display System) Blocks A, B, C. (Limited procurement based on authority to procure in advance of approval for service use.) RDT&E hardware procurements for Increment two complete. Project X0798: Provide over-the-horizon targeting support to surface launched anti-ship TOMAHAWK as that system achieves initial operational capability. Continue integration of over-the-horizon targeting capability improvements into Navy Command and Control System. Support command and control/over-the-horizon targeting tactical data display systems at land based test site. Conduct advanced concepts research in selected areas to improve battle damage assessment, over-the-horizon targeting, net connectivity, etc. Continue development of an over-the-horizon targeting capability for P-3 and other selected air platforms. Complete integration of the over-the-horizon targeting processing functions into TOMAHAWK Common Weapons Control System. Conduct initial test and evaluation of the HARPOON targeting/processing system. Continue systems engineering support and capability assessment efforts. Expand the technology base to include NATO programs related to over-the-horizon targeting. Program Element 63530N, projects X1147 and X1298 are subsumed under this project beginning in FY 1983. Project Z1573: Identify critical Navy Command and Control nodes and links to be assessed for electromagnetic pulse hardness and begin assessments; identify electromagnetic pulse hardening technology to be developed and/or certified for Navy use and begin certification procedures; set objectives and norms with which to develop cost-vs-effectiveness assessment tools; specify instrumentation needed but lacking to verify hardness of command and control equipment, especially during design, development, and production.

Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Project X0709: Operational evaluation commences second quarter FY 1984. Continue deployment and evolutionary development of Flag Data Display System. Project X0798: Continue development of over-the-horizon targeting capability for HARPOON-only ships. Implement improved over-the-horizon/detection, classification and targeting algorithms. Support over-the-horizon/detection, classification and targeting interface definition/design for airborne platforms. Support Ultra High Frequency and Super High Frequency Satellite Communications Tactical Data Information Exchange System for Shore Targeting Terminal, Common Weapons Control System, Combat Control System MK I, Tactical Flag Command Center, etc. Implement Standard Digital Cartographic Map. Continue to support Navy Command and Control System over-the-horizon/detection, classification and targeting upgrade. Begin High Frequency improvement program and over-the-horizon/detection, classification and targeting operational testing. Execute over-the-horizon detection, classification and targeting Configuration Management Plan. Project Z1573: Continue electromagnetic pulse survivability assessments and hardening design of afloat command and control elements and extend to airborne and ashore nodes; continue development and certification of electromagnetic pulse hardening technology; continue development of electromagnetic pulse hardening specifications for Navy Command and Control elements; begin development of cost-vs-effectiveness methodology for electromagnetic pulse protection of Tactical Navy Command and Control: begin prototype development and design specification of standard subsystem-level testing methodology and equipment to verify degree of electromagnetic pulse resistance achieved.

5. (U) Program to Completion: Based on results of test site and afloat testing and evaluation, acquisition of production system will be completed leading to full operational capability in FY 1987. The system will continue to be enhanced in an evolutionary manner as defined by fleet developed requirements. Project X0798, Over-the-Horizon Targeting: Complete integration of the over-the-horizon targeting capability within Navy Command and Control System. Continue evolutionary expansion and block improvements of over-the-horizon targeting systems ashore and afloat. Continue development of systems to enhance over-the-horizon targeting capability for surface ships. Develop and incorporate upgrades to applicable systems as over-the-horizon targeting requirements dictate. Continue the project until operational evaluation has demonstrated that the required over-the-horizon targeting capability has been fully implemented.

6. (U) Milestones: Not applicable.

Project: X0709
Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Navy Command and Control System Afloat
Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Tactical Flag Command Center is the battle station for the Officer in Tactical Command. The Tactical Flag Command Center will support the tactical commander in his decision making process by receiving and displaying information relative to the current tactical situation. In August 1979 the Chief of Naval Operations approved the use of an incremental evolutionary approach for the Tactical Flag Command Center. A plan for accelerated deployment of the baseline system was approved by the Chief of Naval Operations in March 1980. The Tactical Flag Command Center was given a Rapid Development Capability designation in July 1980. The Chief of Naval Operations tasked the Chief of Naval Material to define an improved baseline in November 1980. The improved baseline system is defined as follows: Increment one is the establishment of the command center spaces equipped with extension of existing flagship capabilities such as the Navy Tactical Data System consoles and access to communications. Increment one provides the austere essential command center capability and stands alone as a requirement. Increment two (approved for service use applicable) is described as four blocks. Block A is core automatic data processing system and one terminal; Block B is a set of additional operator terminals; Block C is a communications package providing access to satellite transmissions and selected Navy Tactical Data System data; and Block D is a large screen display group. Increment three provides for improvements to the Flag Data Display System through software enhancements and the application of enhanced technology. Limited procurement of the Flag Data Display System in advance of approval for service use was approved by the Chief of Naval Operations in November 1981.

(U) *RELATED ACTIVITIES: Program Element 64711N, X1144 Navy Command and Control System Shore Node.*

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Engineering Center, Portsmouth, VA; Naval Electronic Systems Activity, St. Inigoes, MD. Contractors: Lockheed Missile and Space Company, Inc., Sunnyvale, CA; Science Applications, Inc., Arlington, VA; Vitro Laboratories, Silver Spring, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: The accelerated Flag Data Display System is a derivative of the existing AN/USQ-81(V) which has undergone extensive testing as part of the over-the-horizon/detection, classification and targeting project. Flag Data Display System development models have been installed on USS MIDWAY and USS AMERICA. A tactical Flag Command Center mock-up and fleet visit program has been established. A land based prototype at Naval Ocean Systems Center, San Diego, CA is presently operational with an engineering development model (modified AN/USQ-81(V)). A formal test phase has been completed in conjunction with USS MIDWAY operations in the Indian Ocean. An operational test involving both ships was completed in 1980/1981.

2. (U) FY 1982 Program: Continue hardware procurement and software testing for baseline system. Prepare specification for large screen display. Commence Flag Data Display System technical evaluation at Land Based Prototype. Continue Increment one battle space ship alteration on USS AMERICA (operational evaluation platform). Continue mock-up demonstration and fleet visits at

Project: X0709
Program Element: 63717N
DoD Mission Area: 353 - Naval Warfare

Title: Navy Command and Control System Afloat
Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

prototype to aid in evolutionary development. Conduct Command and Control architectural study and begin system design for increment three Tactical Flag Command Center. Procure four Increment two (Flag Data Display Systems) Blocks A, B, C for software support agency, team/operator trainer and two platforms. (Limited procurement based on authority to procure in advance of approval for service use. Flag Data Display System installation is planned for the fourth quarter of FY 1982.

3. (U) FY 1983 Planned Program: Install Increment two (Block D) at land based prototype commencing mid FY 1983 and conduct test and evaluation late FY 1983. Install Flag Data Display System aboard USS AMERICA (operational evaluation platform). Continue system design for Increment three Tactical Flag Command Center. Complete Increment one alteration and installation on five carriers and Increment two (Flag Data Display System) on two carriers. Procure hardware for seven Increment one's and two Increment two's (Flag Data Display Systems) Blocks A, B, C. (Limited procurement based on authority to procure in advance of approval for service use.)

4. (U) FY 1984 Planned Program: Operational evaluation commences second quarter FY 1984. Continue deployment and evolutionary development of Flag Data Display System.

5. (U) Program to Completion: Based on results of test site and afloat testing and evaluation, acquisition of production systems will be completed leading to full operational capability in FY 1987. The system will continue to be enhanced in an evolutionary manner as defined by fleet developed requirements.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0709	Navy Command and Control System Afloat	10,452	8,780	11,379	6,172	Continuing	Continuing

Project: X0798
Program Element: 63717N
DOD Mission Area: 353 - Naval Warfare

Title: Over-the-Horizon Targeting
Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project X0798, Over-the-Horizon Targeting, is a research and development effort designed to explore and determine the optimal methods of conducting over-the-horizon targeting by maximizing the use of existing and programmed sensors, fire control systems, command and control supporting systems, and communications systems. The method to accomplish the program objectives or capability to target hostile naval units from over-the-horizon consists of three phases which include concept definition, fleet demonstrations, and a capability assessment. The results of the research and development efforts are used as the basis for over-the-horizon targeting improvements to the Navy Command and Control system. Equipment procurement and system changes to implement improvements are then initiated by the appropriate program sponsors. The over-the-horizon detection, classification and targeting program has been restructured to fall into a single R&D project beginning in FY 1983.

(U) RELATED ACTIVITIES: Program Element 64367N, Project X0545, TOMAHAWK Missile System and Program Element 24660N, Navy Command and Control Systems.

(U) WORK PERFORMED BY: Technical direction is performed by Navy Command and Control Program Manager, Naval Electronic Systems Command, Washington, DC, with technical support provided by the Naval Ocean Systems Center, San Diego, CA, and Applied Physics Laboratory, Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The purpose of this project is to provide for the planning of the overall over-the-horizon targeting capability within the Navy Command and Control System, to evolve tactics and doctrine, to support fleet over-the-horizon exercises, and to conduct the engineering analysis of these exercises. This project has resulted in the development of over-the-horizon targeting tactics and doctrine and an operational targeting capability. This capability is being incorporated into the Common Weapons Control System and the Combat Control System MK I for surface ships and submarines respectively. Other accomplishments have included modification of the Ocean Surveillance Information System nodes to provide targeting data from remote sensors to firing ships which are in a position to receive data constantly and to the submarine operating authorities for further transfer to the cruise missile capable submarines. Additional gains have been made in the areas of communications connectivity and systems interface. The Tactical Flag Command Center Program is also utilizing technology developed under this project. Installation schedules for programmed systems are as follows:

Project: X0798
Program Element: 63717N
DOD Mission Area: 353 - Naval Warfare

Title: Over-the-Horizon Targeting
Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

OVER-THE-HORIZON TARGETING SYSTEMS

	FY 81	FY 82	FY 83	FY 84	FY 85	FY 86	FY 87	FY 88	FY 89	FY 90
Shore Targeting Terminals (Submarine Force Commanders)	2									
Combat Control System MKI (Submarine - 637/688 Class)		1	6	8	10	11	10	8	7	9
Common Weapons Control System (Ships - DD 963/CGN Class)		2	1	6	7	7	4	3		

2. (U) FY 1982 Program: Block improvements to Navy Command and Control System over-the-horizon targeting capability will be accomplished. Development of an over-the-horizon capability for P-3 aircraft and supporting Anti-Submarine Warfare Operations Centers will be initiated. Expansion of the over-the-horizon capability to include long range air threats will commence. Communications research to enhance over-the-horizon network connectivity and own force locating will be conducted. Exercise analysis and advanced concepts research will also be accomplished. Provide over-the-horizon targeting support to anti-ship TOMAHAWK as that system achieves initial operational capability.

3. (U) FY 1983 Planned Program: Provide over-the-horizon targeting support to surface launched anti-ship TOMAHAWK as that system achieves initial operational capability. Continue integration of over-the-horizon targeting improvements into the Navy Command and Control System. Support command and control/over-the-horizon targeting tactical data display system at the land based test site. Conduct advanced concept research in selected areas. Continue development of P-3 and other platform HARPOON over-the-horizon targeting system. Continue communications research required to interface over-the-horizon targeting system with developing communications systems designed to support over-the-horizon targeting requirements. Develop improved ship tracking and missile engagement planning software.

4. (U) FY 1984 Planned Program: Commence preparation for the over-the-horizon missile targeting evaluation. Implement improved targeting and tracking software. Continue support of ship launched cruise missile testing and development of improved HARPOON over-the-horizon targeting capability. Commence support of implementation/systems interface of the tactical data information exchange subsystem.

Project: X0798
Program Element: 63717N
DOD Mission Area: 353 - Naval Warfare

Title: Over-the-Horizon Targeting
Title: Command and Control Systems (Advanced)
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Continue block improvements/expansion of the over-the-horizon targeting capability to support the employment of all long range weapons in all theaters.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0798	Over-the-Horizon Targeting	5,208*	10,725*	11,675	11,270	Continuing	Continuing

*Funded in Program Element 63530N.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63719N
DoD Mission Area: 262 - Sealift

Title: Container Offloading and Transfer System
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,336	8,045	6,067	0	0	36,906
Y0816	Container Offloading and Transfer System	1,336	2,052	6,067	0	0	30,913
Y1576	Sealift Enhancement	0	5,993	0	0	0	5,993

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides for the Navy development portion in support of (and an element of) the DoD Master plan for a Container Supported Distribution System. Development provides deployable equipments to discharge non-selfsustaining containerships and other ships where deep water ports with container handling equipment are not available. Development includes: (a) ship offloading subsystem consisting of cranes and other lift equipment and ramps; (b) ship-to-shore subsystems consisting of pontoon causeway components for container and other cargo movements from merchant ships; (c) common elements and ancillary equipment requisite to integrate the total Container Offloading and Transfer System.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue engineering validation testing of temporary container discharge facility crane sea state three motion compensation devices and roll-on/roll-off offloading facility in preparation for technical evaluation and operational evaluation tests. Conduct tests during the fourth quarter. Continue preparation of Approval for Service Use Documentation for those systems. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1983 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: The FY 1982 funds shown as $8,053 in the FY 1982 Descriptive Summary were separated into two projects, Y0816 Container Offloading and Transfer System and Y1576 Sealift Enhancement. Additionally, the FY 1982 total was reduced by $8 due to a general inflation reduction. Y0816 Container Offloading and Transfer System: The FY 1983 amount, shown as TBD in the FY 1982 Descriptive Summary, is now shown as $6,067. This amount will permit accomplishment of efforts described in Basis for FY 1983 Request paragraph.

ı Element: 63719N
ısion Area: 262 - Sealift

Title: Container Offloading and Transfer System
Budget Activity: 4 - Tactical Programs

'UNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	5,447	1,336	8,053	TBD	TBD	TBD
Container Offloading and Transfer System	5,447	1,336	8,053	TBD	TBD	TBD

YTHER APPROPRIATIONS FUNDS: (Dollars in Thousands)

rocurement)	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
ıry Container Discharge Facility Cranes		11,876		11,002	37,718	60,596
Quantity		2		1	6	9
ed Causeway Pierhead Cranes		458		518	2,299	3,275
Quantity		1		1	4	6
l Causeways				20,675	124,856	145,531
Quantity				18	111	129
ıry Container Discharge Facility Fenders and Moorings				1,785	7,734	9,519
Quantity				2	6	8
ed Causeways		3,267		7,610	22,582	33,459
Quantity		1		1	2*	4
g Tugs		8,501		7,095	50,641	66,237
Quantity		7		6	40	53
r Aboard Ship Lift Beams					5,781	5,781
Quantity					6	6
ı/Roll-off Ramps					24,562	24,562
Quantity					8	8

ıdes one Elevated Causeway Unit, one additional Elevated Causeway Unit to replace unit bought in FY 1978, and four Elevated ıy extensions.

Program Element: 63719N
DoD Mission Area: 262 - Sealift

Title: Container Offloading and Transfer System
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Program implements the development assigned to the Navy under the Department of Defense Master plan for Container Systems as further amplified in the Assistant Secretary of Defense (Installation and Logistics) Over-the-Shore Discharge of Containerships Definition Paper. The employment of U.S. Flag merchant ships for contingency sealift into areas lacking port terminals for modern container ships is dependent on this program to develop means for ship offloading. The permanent conversion of merchant ships and the acquisition of dedicated deployable container discharge facilities are costly options that this program is avoiding through judicious employment of commercial assets with a minimum number of add-on developments.

(U) RELATED ACTIVITIES: USMC's Field Logistics System, PE 63635M (addresses shoreside USMC developments which interface with container offloading and transfer system); Offshore Bulk Fuel Transfer System, PE 63705N (addresses bulk fuel offloading and transfer which complements dry cargo container transfer system).

(U) WORK PERFORMED BY: In-House: Naval Facilities Engineering Command, Alexandria, VA; Naval Sea Systems Command, Washington, DC; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Coastal Systems Center, Panama City, FL; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA. Contractors: FMC Corporation, San Jose, CA; J.J. Henry Company, Moorestown, NJ; Manitowoc Engineering Works, Manitowoc, WI; EG&G Washington Analytical Services Center, Inc., Rockville, MD; Tracor Marine, Jacksonville, FL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project initiated in July 1974. Completed first phase of elevated causeway Operational Test and Evaluation during Joint Navy/Army Logistics-Over-the-Shore test. Conducted full scale Operational Test and Evaluation of Elevated Causeway. Obtained Provisional Approval for Service Use and commenced procurement of first service unit. Approval for Service Use has been requested. Conducted engineering validation and operational evaluation tests of Waterjet Propulsion Assembly which will be added to a causeway section for use as a Powered Causeway Section or Side-Loadable Warping Tug. Units will be side-carried on a Landing Ship Tank amphibious ship. Operational Evaluation completed. Tested portable hatch cover "bridge" units to enable positioning of mobile cranes on the decks of non-selfsustaining containerships. Continued development testing of instrumented commercial cranes to determine afloat parameters and validate analytical rating models. Completed initial industry survey of commercial cranes to determine availability, locations, and technical characteristics. Completed survey of commercial ships to determine availability and salient interface features for employment with mobile cranes-on-deck and Temporary Container Discharge Facilities. Completed structural and stability analyses of selected merchant ships to function as system platforms. Commenced conceptual analyses of motion compensated cranes to facilitate container handling in offshore environment. Completed full scale design, fabrication and installation of a pendulation control (Rider Block Tagline System) on the Manitowoc 4100W crane test article. Commenced afloat rating analyses to determine the capability of selected commercial land cranes to operate offshore. Modified B-Delong barge and installed foundation for 4100W crane. Instrumented and completed engineering

Program Element: 63719N
DoD Mission Area: 262 - Sealift

Title: Container Offloading and Transfer System
Budget Activity: 4 - Tactical Programs

development test of the 4100W crane offshore on a barge platform. Prepared specifications to develop motion compensation add-on to the 4100W crane. Contracted to design and develop the motion compensation system. Continued long-term testing of full-size, modular Tethered Float Breakwater. Continued conceptual analyses and commenced engineering validation tests of alternatives to discharge Roll-on/Roll-off ships moored offshore. Awarded contract for design and fabrication of Roll-on/Roll-off discharge system development models. Completed technical and operational evaluation of the Temporary Container Discharge Facility in sea state two (4ft waves) with an anti-pendulation device (rider block tagline), crane foundation and facility ancillary components. Evaluated technical and operational reports for deficiency corrections in FY 1982. Continued correction of deficiencies on the waterjet propulsion assembly of the Powered Causeway and prepared documentation required for provisional Approval for Service Use in preparation for procurement in FY 1982.

2. (U) FY 1982 Program: Y0816 Container Offloading and Transfer System: Finalize Roll-on/Roll-off offload ramp design followed by fabrication and testing. Y1576 Sealift Enhancement: Complete operational test and evaluation after correction of discrepancies and prepare documentation for Approval for Service Use preparatory to third quarter FY 1982 Temporary Container Discharge Facility crane procurement. Resume development of the motion compensation device and orientation control system to permit Temporary Container Discharge Facility crane operations in sea state three. Finalize documentation and correct any outstanding discrepancies on the Powered Causeway prior to procurement in the third quarter of FY 1982.

3. (U) FY 1983 Planned Program: Projects Y0816 Container Offloading and Transfer System and Y1576 Sealift Enhancement are combined into Y0816. Complete development and testing of Roll-on/Roll-off offloading facility for sea state one operations. Complete development and testing of Temporary Container Discharge Facility crane motion compensation device and orientation control system to permit sea state three operations.

4. (U) FY 1984 Planned Program: Not applicable. Development program ends in FY 1983.

5. (U) Program to Completion: Development program ends in FY 1983.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63724N
Title: Navy Energy Program (Advanced)
DOD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	16,743	17,478	21,504	31,487	Continuing	Continuing
S0829	Energy Conservation/Advanced	7,290	8,854	12,208	15,955	Continuing	Continuing
S0838	Mobility Fuels/Advanced	7,891	8,624	9,296	15,532	Continuing	Continuing
20840	Alternative Energy Systems/Advanced	1,562	0	0	0	0	5,476

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Program supports projects aimed at evaluating, adapting and/or developing energy related technology for ship, aircraft, and land based operations to: (a) conserve energy and reduce energy costs; (b) develop a capability to operate on fuels derived wholly or in part from synthetic crudes and on broadened specification, conventional, petroleum based fuels (i.e. fuels with less tightly controlled properties and/or commercial grade fuels) and (c) reduce Navy base dependence on petroleum based fuels by pursuing energy technology efforts aimed at applying alternate and advanced energy technologies to specific Navy base needs (e.g. coal, solar, geothermal, and waste product). Many of these tasks are joint efforts with other Executive Agencies and DOD Services. Although these efforts support Navy energy consumption goals, they also fully support the National Energy Program and related executive orders.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Energy Conservation/Advanced: Projects will provide the technology to achieve energy conservation goals established in Executive Order 12003 and expanded by Chief of Naval Operations Instruction 4100.5A and to achieve significant energy cost reductions. The Energy R&D Program's contribution to achievement of these 1985 energy conservation goals will produce Navy wide savings approximating 0.5 billion dollars per year at 1981 fuel prices. Many subprojects are entering the final stages of development before undergoing field trials. The ships conservation area places heavy emphasis on reduction of ship hull drag using advanced underwater hull cleaning and anti-fouling paint technology, cost-effective short-term shipboard machinery improvements for existing and planned vessels, and hull and propulsor hydrodynamic optimization for future ships. The aircraft projects will emphasize development of selected, cost effective design modifications to existing aircraft and improved operating techniques. In the facilities area minor emphasis will be placed on experimental work for retrofitting facilities and will include building thermal design, cogeneration, and energy monitoring and control concepts. Mobility Fuels/Advanced: This project will emphasize (a) development of improved, less costly, new fuels acceptance procedures and (b) continuation of tests in military engine components (gas turbine and diesels), boilers, and fuel handling systems with fuels derived from the low quality conventional and synthetic sources that will enter the supply system in the near future. There is a 23% increase in total program element funding between FY 1982 and FY 1983. The funding increase is necessitated by the

Program Element: 63724N
Title: Navy Energy Program (Advanced)
DOD Mission Area: 235 - Naval Warfare Support
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maturing of subprojects in both the conservation and mobility fuels projects. For example, combustor testing of fuels will expand from small scale testing of broadened specification petroleum fuels to more expensive component testing with shale derived fuels delivered under Defense Production Act agreements. Similarly, optimized near-term hull and propeller design improvements will progress from paper studies to extensive ship model testing. The aircraft conservation project will transition from a simple evaluation of operating procedures and conservation ideas for existing aircraft to a technology and subsystems development project aimed at planned and future aircraft efficiency improvement. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary show a decrease in FY 1982 of 1,632 and a decrease in FY 1983 of 6,023 resulting from overall reductions in the total Navy RDT&E Program during those years. The level of effort in the individual projects has been reduced roughly in proportion to the overall reduction in the program, with the Energy Conservation project being reduced least because of its near-term objectives.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	7,904	16,731	19,110	27,527	Continuing	Continuing
S0829	Energy Conservation/Advanced	4,844	7,297	9,254	14,743	Continuing	Continuing
S0838	Mobility Fuels/Advanced	3,060	7,744	9,856	12,784	Continuing	Continuing
S0840	Energy Self-Sufficiency/Advanced	0	1,690	0	0	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: 63724N
Title: Navy Energy Program (Advanced)
DOD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The program is designed to contribute to maintaining fleet operating tempos leading to improved readiness, and to reduce the impact on Navy operations of escalating fuel costs and supply interruptions. Fulfillment of the Navy's mission is directly dependent on an adequate, uninterrupted and affordable supply of energy. There have been recent trends towards reduction in operating tempos, due in large part to escalating fuel costs. The Navy's fuel bill, which was $0.5 billion in FY 1974 increased to $3.0 billion in FY 1980. There is, therefore, an urgent need for efforts aimed at increased energy conservation to help alleviate the impact of increasing energy costs on Navy operations. The Navy's program is consistent with conservation goals stated in the White House Executive Order 12003. The Navy is stressing participation in cooperative ventures with other agencies and Department of Defense services in all project areas. This element supports development of procedures and equipment to improve the Navy's energy posture through three (3) project areas: 1) Energy Conservation/Advanced: Improvements will be made in the overall energy conservation efficiencies of naval systems and energy use will be reduced while maintaining readiness. Ship Conservation: The development and use of advanced underwater hull cleaning methods to reduce hull drag caused by fouling will provide, in the near-term, over 8% savings in ship energy usage. Development and use of improved anti-fouling paints expected by 1985 will eliminate the requirements for frequent hull cleaning between overhaul periods and represents an additional energy saving of 10% over hull cleaning. Further developments are expected in the machinery area with the use of stack gas analyser-controller boilers, improved boiler burners and economizers, improved auxiliary power equipments, machinery performance monitoring systems and reduction in fresh water use. The projected savings associated with these areas are approximately 20% per steaming hour by 1985. Aircraft Conservation: The aircraft program is directed at modifying equipments and operating techniques for existing inventory aircraft with emphasis on major consumers (e.g. P-3, A-6, A-7, and F-4) and with technology benefit expected for certain other types. Modifications must not only save energy but must be cost-effective and not adversely effect operational readiness. Techniques and procedures being investigated include cost-effective drag clean-up methods, computer flight management aids, improved fuel management equipments, fuel-efficient operating methods, and engine efficiency modifications. Facility Conservation: The facility energy conservation program will emphasize those project areas where potential cost savings are highest. The major thrust is to meet the DoD and CNO goals of a reduction in facility energy use of 20% in existing structures and 45% in new structures by 1985. Primary emphasis is being placed on potential retrofits to existing buildings to meet this deadline. Tasks have been identified that will have the highest payback potential. The tasks include cogeneration (steam and electricity from a single source) of energy on Naval bases, energy monitoring and control systems based on new microprocessor technology, electrical system improvements, improved building thermal design and energy-conserving tune-up and modifications of existing heating, ventilating and air conditioning systems. Activity in this area will be limited to those areas where potential cost savings and return on investment are very high. 2) Mobility Fuels/Advanced: This project includes the conduct of tests in small scale experimental engine equipment and fuel handling systems to evaluate for Navy use, (a) fuels derived from synthetic and low quality conventional crudes which will enter the marketplace in the near future, and (b) fuels of broader specifications than current military specifications to improve operational flexibility. The data generated will allow the early development of improved fuels acceptance procedures to make a significant reduction in the time and cost presently involved. Tests are also conducted to determine effects of personnel exposure to new fuels to enable health effects comparisons to be made with conventional fuels. 3) Alternative Energy Systems/Advanced: This project provided for the technical and economic

evaluation of geothermal resources, new solar and wind energy technologies, direct coal utilization energy systems to burn high sulfur, low cost coal, and waste to fuel energy systems at appropriate Navy bases to reduce Navy base dependence on petroleum based fuels.

(U) RELATED ACTIVITIES: Projects initiated in this element have been specifically identified in Research and Exploratory Development as being the most promising projects in terms of potential pay back in monetary value. Projects and sub-projects in this program element transition to PE 64710N, Navy Energy Program (Engineering), after successful completion of their advanced development phases. Numerous interservice and interagency cooperative programs are in effect for the three project areas.

The following is a partial listing:

Information exchange on aircraft systems	Air Force
Seawater air conditioning	Department of Energy
Power plant waste energy utilization system	Department of Energy
Coal Utilization	Army, Department of Energy
Waste to Energy	Air Force, State of California
Geothermal Energy development	Department of Energy, Bureau of Land Management, Various State Governments
Alternative Fuels Test Procedure Development	Army
Joint Program on Synthetic Fuel Test and Evaluation	Air Force, Army, Department of Energy, NASA
Joint Gas Turbine Combustor Test Program	Air Force

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Annapolis, MD; Naval Air Development Center, Warminster, PA; Naval Air Propulsion Center, Trenton, NJ; Civil Engineering Laboratory, Port Hueneme, CA; Naval Weapons Center, China Lake, CA; Naval Ship Systems Engineering Station, Philadelphia, PA. Contractors: Acurex, Mountain View, CA; United Technologies, West Palm Beach, FL; Detroit Diesel Allison, Indianapolis, IN; General Electric Corporation, Cincinnati, OH; South West Research Institute, San Antonio, TX; Exxon Research and Engineering Co, Linden, NJ; Grumman Aerospace Corp, Bethpage, NY; Lockheed California Co., Burbank, CA; McDonnell Douglas, St. Louis, MO; Sundstrand Corp., Rockford, IL; California Energy Co., Santa Rosa, CA.

Program Element: 63724N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Energy Conservation/Advanced: Ship Conservation: Several Navy developed anti-fouling paints produced in laboratory quantities and applied to ship hulls as "belly stripes" had demonstrated 30 months of fouling free performance on USS OUELLET (FF 1077) and 26 months on USS JONAS INGRAM (DD 938) as of October 1981. Testing on these ships will continue toward a scheduled 60 months of exposure. However, results to date warrant expeditious scale-up to commercial quantities of paint. Several commercial paints offering up to 36 months of anti-fouling protection are being evaluated as a possible interim means of saving energy. R&D on water resource management techniques has been completed and modified equipments are being implemented in the fleet (e.g. reduced flow showers, laundry and garbage disposal systems) which will reduce potable water consumption on ships by up to 50%. Aircraft Conservation: Re-engining study for P-3 aircraft performed. Study of refueling practices at selected Naval Air Stations completed and switch from hot to cold (truck delivery) refueling recommended. Extensive surveys of fuel conservation concepts have been performed for the six major fuel users (i.e. F-4, P-3, A-6, A-7, A-4, F-14). Increased use of flight planning aids, general sensitivity to fuel conservation issues, and increased use of simulators has reduced aircraft fuel consumption 6.5% relative to FY 1975. Facilities Conservation: In cooperation with the Department of Energy and other Federal agencies, qualification of high pay-back energy conserving technologies has commenced for the Navy operational environment. These include energy monitoring/control systems, advanced power generation techniques, new energy loss detection techniques and improvements in reducing thermal losses of existing buildings. For example, under a joint Navy/Air Force effort, an analysis of hangar heating energy flow has been performed and field tests procedures developed. Energy loss detection equipment has been evaluated, and is now being used to conduct field evaluations. Mobility Fuels/Advanced: Gas turbine, diesel engine, and boiler tests were completed on products from a 10,000 bbl quantity of shale oil crude demonstrating the basic suitability of such fuels for military use. A 100,000 bbl experiment has been completed which was intended to extend the data base obtained in these tests by providing larger quantities from refining processes more representative of commercial operations as part of a joint Department of Defense/Department of Energy program. Test and evaluation efforts in Navy systems are close to completion and data analysis is underway. The market survey phase of a study to examine the feasibility of using broadened specification fuels when military specification fuels are unavailable or in short supply, has been completed. Characterization of petroleum fuels refined from heavy, sour crudes has been initiated. Contracted efforts have been initiated to develop improved, less costly, fuels acceptance procedures for both ship and aircraft systems. The first task in this effort recommending fuel/hardware test procedures for Naval aircraft has been completed. In the area of fuels toxicology, work to determine shipboard exposure levels of personnel to synthetic fuels and to determine whether or not synthetic fuels can be expected to be more toxic than conventional fuels is close to completion. Alternative Energy Systems/Advanced: Evaluation of test wells at the COSO hot springs at Naval Weapons Center, China Lake, CA, has been completed and a contract has been signed with California Energy Co. to develop the geothermal resource there to produce electrical power for the Navy. Evaluation of potential wind energy systems and locations has been made. Tests of burning waste oils from ships in facility boilers have been completed with excellent results, thus providing the potential for large savings in fuel oil and costs.

Program Element: 63724N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Ship Conservation: Work will continue on development of advanced anti-fouling hull and propeller coatings and monitoring of hull cleaning effectiveness. Work will accelerate on the development of high efficiency heating/air conditioning, lighting, and auxiliary electric motors. Major efforts are underway to improve the efficiency of the Detroit Diesel Allison 501-K17 gas turbine for auxiliary power generation on gas turbine powered ships and to develop an energy storage system for shipboard use. Testing of more efficient propulsor concepts such as "bearing in rudder post" and pod-mounted electric drive will be conducted. Aircraft Conservation: Pocket-sized flight performance advisory computers for permanent use on F-4 and A-4 aircraft, and for interim use on aircraft which are candidates for on-board flight performance advisory/management systems (e.g. A-6, F-14, P-3, A-7), will be developed, as will ground based pre-flight planning computers for use throughout Naval aviation. Potential fuel conservation techniques for planned aircraft such as F/A-18, AV-8B, SH-60B, HXM, etc. will be screened for feasibility and cost effectiveness. Initiate development of fuel efficient T-56 engine modification for the E-2C and other Naval aircraft. Study fuel dumping procedures by KA-6D tanker aircraft. Determine configuration of flight management systems for P-3 and S-3A aircraft. Facilities: The tasks previously initiated placed a strong emphasis on identifying potential retrofit programs based on existing technology. Requirements for a R&D program were identified where a fully developed and qualified technology base was insufficient for Navy use and payback was high. Based on this analysis, some experimental work will continue on improving energy monitoring/control systems, reducing building thermal losses, recovering heat from training simulators and computer facilities, and cogeneration methods. Mobility Fuels/Advanced: Military engine test and evaluation efforts on the fuels produced from the joint Department of Defense/Department of Energy shale oil experiment will be completed (aircraft propulsion system tests are completed, ship propulsion system tests will be completed in FY 1982). Investigations of the use of broadened specification fuels for ship and aircraft use will be extended to determine the relationship of fuel characteristics to engine performance. A test matrix of six aircraft combustors and ten projected fuels, including shale oil derived, will be conducted to select the most fuel property sensitive engines for use in Program Element 64710N engine test programs. Contracted efforts to develop improved, less costly, fuels acceptance procedures will continue. Toxicological studies involving the determination of shipboard personnel exposure levels to fuel vapors will be completed.

3. (U) FY 1983 Planned Program: Ship Conservation: Monitoring of hull cleaning effectiveness and conduct of an environmental impact study for advanced anti-fouling paints will continue. Intense efforts to evaluate potential near term hydrodynamic improvements and to develop energy storage and high efficiency heating/air conditioning systems will continue. Major effort to improve the 501-K17 turbo generator system efficiency by 10% will continue. Advanced hull configurations and optimized conventional hull and propeller configurations will commence prototype demonstration. Certain auxiliary equipments (e.g. high efficiency lighting and electric motor) projects will be completed or transitioned to Engineering Development supported by P.E. 64710N. Aircraft Conservation: Continue development of pocket sized and ground based flight planning/advisory systems. Survey other existing fleet aircraft to determine applicability of fuel conservation concepts already studied for the six highest fuel users: P-3, F-4, F-14, A-6, A-7, A-4. Facilities: Work will emphasize cooperative efforts with the other services in those areas where the potential for significant energy and costs savings is high. This will include efforts to reduce thermal losses in buildings and utility lines, and further efforts in energy monitoring/control systems technologies. Mobility Fuels/Advanced:

Program Element: 63724N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

Engine component testing with military specification fuels from synthetic crude sources refined by commercial operations will begin as part of a continuing Department of Defense program supported by the Defense Production Act loan guarantee to Union Oil. Evaluation of broadened specification petroleum fuels will continue. Combustor tests of fuels with widely varying properties and work on fuel thermal stability and cold flow properties will be completed. The data produced will be used to begin evaluation and validation of the improved fuels acceptance procedures being developed in a parallel portion of the program. All work that is mature enough to require full scale engine and boiler system tests will transition to Engineering Development.

4. (U) FY 1984 Planned Program: Ship Conservation: An environmental impact statement for use of advanced anti-fouling paints will be completed. Development of the improved 501-K17 turbo generator with fuel consumption reduced 10% will be completed. Advanced development of energy efficient hull and propulsor concepts will continue with emphasis on optimization of the conventional displacement hull and conventional propeller for near-term ship designs. Development of energy storage techniques for emergency power continues. Aircraft Conservation: Development of energy-saving technologies and subsystems needed to support advanced air vehicle designs and/or operations will continue. Fleet use of pocket size and ground based flight planning/advisory computers will be monitored and evaluated. Facilities: Minor efforts will continue in areas of reducing thermal losses in Navy facilities and identifying technologies to reduce energy costs and Navy dependence upon petroleum based fuels. Mobility Fuels/Advanced: The final phase of the improved fuels acceptance procedures development program will be initiated. Begin engine component test work with military specification fuels from synthetic crude sources (shale oil) under *Defense Production Act Agreement with TOSCO Corporation.* *Work on broadened specification* conventional fuels will continue with small scale engine and boiler system tests of fuels with characteristics most typical of those which will enter the Navy supply system in the mid 1980's.

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

6. (U) Milestones: Not Applicable.

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Project: S0829 Title: Energy Conservation/Advanced
Program Element: 63724N Title: Navy Energy Program (Advanced)
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The purpose of this project is to contribute to increased fleet operating tempos leading to improved readiness, and to reduce the impact on Navy operations of escalating fuel costs and supply interruptions. Fulfillment of the Navy's mission is directly dependent on an adequate, uninterrupted and affordable supply of energy. Further reductions in operating tempo have been necessary due in large part to escalating fuel costs. The Navy's fuel bill, which was $0.5 billion in FY 1974, increased to $3.0 billion in FY 1980. There is, therefore, an urgent need for efforts directed at increased operating efficiency and energy conservation to help alleviate this problem. The Navy program also maintains close liaison with the National Energy Program, and the Navy's conservation goals are consistent with White House Executive Order 12003. The Navy is stressing participation in cooperative ventures with other executive agencies in all energy conservation project areas. This project addresses three platform areas as follows: Ships: The major near term ship conservation task is directed at reduced hull drag caused by fouling. The development and use of advanced underwater hull cleaning techniques will provide, in the near term, over 8% savings in energy usage. In this project, cleaning equipment, techniques and optimum cleaning timetables are developed for application Navy-wide. The second major thrust in this area involves development of improved anti-fouling hull coatings effective for five years or more that will essentially eliminate the requirement for hull cleaning between overhauls and provide an additional 10% reduction in energy usage. Other projects addressing energy conservation for future ship construction involve evaluation and development of more efficient ship hull designs and propulsion, power generating and consuming machinery (e.g. pumps, fresh water distillation, heating, ventilation and air conditioning equipment). Aircraft: The aircraft program is directed at modifying equipments and operating techniques for existing inventory aircraft types with emphasis on major consumers (e.g. P-3, A-6, A-7, and F-14) and with technology benefit expected for certain other types. Modifications must not only save energy but must be cost-effective and not adversely affect operational readiness. Facilities: Facility energy conservation efforts include evaluation of advanced energy conserving technologies for Navy buildings, advanced energy monitoring and control systems, evaluation of cogeneration techniques based on technology development sponsored by the Department of Energy and the commercial sector, and evaluation of electrical system improvements. Activity in this area will be limited to those areas where potential cost savings and return on investment are very high.

(U) RELATED ACTIVITIES: Tasks initiated in this project have been specifically identified in Program Element 62765N Energy and Environmental Protection Technology as being the most promising projects in terms of potential payback and tactical value. Projects and subprojects in this program element transition to P.E. 64710N, Navy Energy Program (Engineering), after successful completion of their advanced development phases. Numerous interservice cooperative programs are in effect for the three project areas. The following is a partial listing:

Information exchange on aircraft systems energy efficiency	USAF, NASA
Energy statistics gathering and measurement techniques	Department of Energy
Power plant waste energy utilization system	Department of Energy
Heat exchanger technology	Department of Energy

Project: S0829 Title: Energy Conservation/Advanced
Program Element: 63724N Title: Navy Energy Program (Advanced)
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Annapolis, MD: Naval Air Development Center, Warminster, PA; Civil Engineering Laboratory, Port Hueneme, CA; Naval Weapons Center, China Lake, CA; and Naval Ship Systems Engineering Station, Philadelphia, PA. Contractors: Grumman Aerospace Corp., Bethpage, NY; Lockheed California Co., Burbank, CA; Detroit Diesel Allison, Indianapolis, IN; McDonnell Douglas, St. Louis, MO; Westinghouse Research Labs, Pittsburgh, PA; General Electric Co., Cincinnati, OH; Hansom Electric Co., Jersey City, NJ; Sundstrand Corp., Rockford, IL; Combustion Engineering Inc., Windsor, CT; California Energy Co., Santa Rosa, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Ship Conservation: Several Navy developed anti-fouling paints produced in laboratory quantities and applied to ship hulls as "belly stripes" had demonstrated 30 months of fouling free performance on USS OUELLET (FF 1077) and 26 months on USS JONAS INGRAM (DD 938) as of October 1981. Testing on these ships will continue toward a scheduled 60 months of exposure. However, results to date warrant expeditious scale-up to commercial quantities of paint. Several commercial paints offering up to 36 months of anti-fouling protection are being evaluated as a possible interim means of saving energy. R&D on water resource management techniques has been completed and modified equipments are being implemented in the fleet (e.g. reduced flow showers, laundry and garbage disposal systems) which will reduce potable water consumption on ships by up to 50%. Aircraft Conservation: Re-engining study for P-3 aircraft was performed. Study of refueling practices at selected Naval Air Stations was completed. Switch from hot to cold (truck delivery) refueling was recommended. Extensive surveys of fuel conservation concepts have been performed for the six major fuel users (i.e. F-4, P-3, A-6, A-7, A-4, F-14). Increased use of flight planning aids, general sensitivity to fuel conservation issues, and increased use of simulators has reduced aircraft fuel consumption 6.5% relative to FY 1975. Facilities: In cooperation with the Department of Energy and other Federal agencies, qualification of high pay-back energy conserving technologies has commenced for the Navy operational environment. These include energy monitoring/control systems, advanced power generation techniques, new energy loss detection techniques and improvements in reducing thermal losses of existing buildings. For example, under a joint Navy/Air Force effort, an analysis of hangar heating energy flow has been performed and field tests procedures developed. Infrared energy loss detection equipment has been evaluated, and is now being used to conduct field evaluations.

2. (U) FY 1982 Prograr Ship Conservation: Work will continue on underwater hull cleaning and an environmental impact study for the advanced anti-fouling paints. Work will accelerate on the development of high efficiency heating/air conditioning, lighting, and auxiliary electric motors. Major efforts are underway to improve the efficiency of the Detroit Diesel Allison 501-K17 gas turbine for auxiliary power generation on gas turbine powered ships and to develop an energy storage system for shipboard use. Testing of more efficient propulsor concepts such as "bearing in rudder post" and pod-mounted electric drive will be conducted. Aircraft Conservation: Pocket-sized flight performance advisory computers for permanent use on F-4 and A-4 aircraft, and for interim use on aircraft which are candidates for on-board flight performance advisory/management systems (e.g.

Project: S0829 Title: Energy Conservation/Advanced
Program Element: 63724N Title: Navy Energy Program (Advanced)
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A-6, F-14, P-3, A-7), will be developed, as will ground based pre-flight planning computers for use throughout Naval aviation. Potential fuel conservation techniques for planned aircraft such as F/A-18, AV-8B, SH-60B, HXM, etc. will be screened for feasibility and cost effectiveness. Initiate development of fuel efficient T-56 engine modification for the E-2C and other Naval aircraft. Study fuel dumping procedures by KA-6D tanker aircraft. Determine configuration of flight management systems for P-3 and S-3A aircraft. Facilities: The tasks previously initiated placed a strong emphasis on identifying potential retrofit programs based on existing technology. Requirements for a R&D program were identified where a fully developed and qualified technology base was insufficient for Navy use and payback was high. Based on this analysis, some experimental work will continue on improving energy monitoring/control systems, reducing building thermal losses, recovering heat from training simulators, and computer facilities, and cogeneration methods.

3. (U) FY 1983 Planned Program: Ship Conservation: Conduct of an environmental impact study for advanced anti-fouling paints will continue. Intense efforts to evaluate potential near term hydrodynamic improvements and to develop energy storage and high efficiency heating/air conditioning systems will continue. Major effort to improve the 501-K17 turbo generator system efficiency by 10% will continue. Advanced hull configurations and optimized conventional hull and propeller configurations will commence demonstration. Certain auxiliary equipments (e.g. high efficiency lighting and electric motor) projects will be completed or transition to Engineering Development supported by PE 64710N. Aircraft Conservation: Continue development of pocket sized and ground based flight planning/advisory systems. Survey other existing fleet aircraft to determine applicability of fuel conservation concepts already studied for the six highest fuel users: P-3, F-4, F-14, A-6, A-7, A-4. Facilities: This consists of efforts to reduce thermal losses in buildings and utility lines, and further efforts in energy monitoring/control systems technologies.

4. (U) FY 1984 Planned Program: Ship Conservation: An updated environmental impact statement for advanced anti-fouling paints will be completed. Development of the improved 501-K17 turbo generator with fuel consumption reduced 10% will be completed thru operational evaluation in FY 1984. Advanced development of energy efficient hull and propulsor concepts will continue with emphasis on optimization of the conventional displacement hull and conventional propeller for near-term ship designs. Development of energy storage techniques for emergency power continues. Aircraft Conservation: Development of energy-saving technologies and subsystems needed to support advanced air vehicle designs and/or operations will continue. Fleet use of pocket size and ground based flight planning/advisory computers will be monitored and evaluated. Facilities: Minor efforts will continue in areas of reducing thermal losses in Navy facilities and identifying technologies to reduce energy costs and Navy dependence upon petroleum based fuels.

Project: S0829
Program Element: 63724N
DOD Mission Area: 235 - Naval Warfare Support

Title: Energy Conservation/Advanced
Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0829	Energy Conservation/Advanced	7,290	8,854	12,208	15,955	Continuing	Continuing

S0838
Element: 63724N
ion Area: 235 - Naval Warfare Support

Title: Mobility Fuels/Advanced
Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

TAILED BACKGROUND AND DESCRIPTION: This project is designed to contribute to increased fleet operating tempos leading to readiness, and to reduce the impact on Navy operations of escalating fuel costs and supply interruptions and degrading ıality. Fulfillment of the Navy's mission is directly dependent on an adequate quality of uninterrupted and affordable of energy. There have been recent trends towards reduction in operating tempos (due in large part to escalating fuel and reductions in fuel quality which have affected ship and aircraft performance and reliability. The Navy program is an part of the National Energy Program. The Navy is stressing participation in cooperative ventures with other government and the other DoD services in all mobility fuels project areas. This project is developing a capability for Navy ships, , and other equipment, which are currently being designed to operate on petroleum based liquid hydrocarbon fuels, to on liquid hydrocarbon fuel produced wholly or in part from our secure, abundant resources of oil shale, coal, and tar (The DoD has commitments under provisions of the Defense Production Act to procure the first commercially produced oil oducts). The project also addresses the near term need to develop: (1) a capability to operate on broadened specification .e. fuels with less tightly controlled properties and/or commercial grade fuels) when conventional military specification e unavailable or in short supply and; (2) the lower quality fuels that are currently entering the supply system, without lsing system performance and reliability. The project includes the conduct of tests on small scale experimental engine ıt and fuel handling systems to evaluate various fuel candidates for Navy use. An early task is the development of led, less costly fuels evaluation procedures which can be used for all future test and evaluation tasks in this project. ıre also conducted to determine personnel exposure levels to new fuels to enable health comparisons to be made with lonal fuels.

LATED ACTIVITIES: Projects initiated in this element have been specifically identified in Exploratory Development Program ı as being the most promising projects in terms of potential pay back in monetary value. Projects and subprojects in this element transition to PE 64710N, Navy Energy Program (Engineering Development), after successful completion of their l development phases. Interservice and interagency cooperative programs are in effect for most project areas. The ıg is an example:

rogram on military mobility fuels test and evaluation	Army, Air Force, NASA, DOE, EPA
tive Fuels Test Procedure Development	Army
ıs Turbine Combustor Test Program	Air Force

RK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Annapolis, MD; Naval Air Propulsion Trenton, NJ; Civil Engineering Laboratory, Port Hueneme, CA. Contractors: Aerotherm, Mountain View, CA; Battelle Memorial te, Columbus, OH; United Technologies, West Palm Beach, FL; Detroit Diesel Allison, Indianapolis, IN; General Electric tion, Cincinnati, OH; Exxon Research and Engineering Co., Linden N.J; South West Research Institute, San Antonio, TX.

Project: S0838
Program Element: 63724N
DOD Mission Area: 235 - Naval Warfare Support

Title: Mobility Fuels/Advanced
Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Gas turbine, diesel engine, and boiler tests were completed in 1976 on military fuel products from a 10,000 bbl quantity of shale oil crude obtained from a private industry development effort demonstrating the basic suitability of such fuels for military use. Subsequently, a joint Department of Defense, DOE, NASA, Environmental Protection Agency, 100,000 bbl experiment was conducted to extend the data base obtained in these tests by providing for test and evaluation of larger quantities from refining processes more representative of commercial operations. Test and evaluation efforts in Navy engine systems are close to completion and data analysis is underway. The market survey phases of a study to examine the feasibilty of utilizing broadened specification fuels from conventional petroleum crudes when military specification fuels are unavailable or in short supply were completed. Characterization of petroleum fuels refined from heavy, sour crudes has been initiated. Contracted efforts have been initiated to develop improved, less costly, fuels acceptance procedures for both Navy ship and aircraft systems. The first task in this effort recommending fuel/hardware test procedures for Naval aircraft has been completed. In the area of fuels toxicology, work to determine shipboard exposure levels of personnel to fuels and/or fuel vapors and to determine whether or not synthetic fuels can be expected to be more toxic than conventional fuels is close to completion.

2. (U) FY 1982 Program: Military engine test and evaluation efforts on the fuels produced from the joint Department of Defense/Department of Energy shale oil experiment will be completed (aircraft propulsion system tests are completed, ship propulsion system tests will be completed in FY 1982). Investigations of broadened specification fuels for ship and aircraft use will be extended to determine the relationship of fuel characteristics to engine performance. A test matrix of six aircraft combustors and ten projected fuels including those derived from oil shale will be conducted to select the most fuel property sensitive engines to test in PE 64710N engine test program. Contracted efforts to develop improved, less costly, fuels acceptance procedures will continue. Toxicological studies involving the determination of shipboard personnel exposure levels to fuel vapors will be completed.

3. (U) FY 1983 Planned Program: Engine component testing with military specification fuels from synthetic crude sources refined by commercial operations will begin as part of a continuing joint Department of Defense program supported by the Defense Production Act loan guarantee to Union Oil. Evaluation of broadened specification petroleum based fuels will continue. Combustor tests of fuels with widely varying properties and work on fuel thermal stability and cold flow properties will be completed. The data produced will be used to begin evaluation and validation of the improved fuels acceptance procedures being developed in a parallel portion of the program. All work that is mature enough to require full scale engine and boiler system tests will transition to Engineering Development.

4. (U) FY 1984 Planned Program: The final phase of the improved fuels acceptance procedures development program will be initiated. Begin component test work with military specification fuels from synthetic crude (shale oil) under Defense Production

Project: S0838
Program Element: 63724N
DOD Mission Area: 235 - Naval Warfare Support

Title: Mobility Fuels/Advanced
Title: Navy Energy Program (Advanced)
Budget Activity: 4 - Tactical Programs

Act Agreement with TOSCO Corporation. Work on broadened specification conventional fuels will continue with small scale engine and boiler system tests of fuels with characteristics most typical of those which will enter the Navy supply system in the mid 1980's.

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

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0838	Mobility Fuels/Advanced	7,891	8,624	9,296	15,532	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63725N
Title: Facilities Improvement
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,230	3,194	5,919	9,064	Continuing	Continuing
Y0995	Naval Facilities Systems	3,230	3,194	2,755	3,377	Continuing	Continuing
Y1077	Expeditionary Maintenance Hangar	-	-	362	962	TBD	TBD
Y1315	Dredge Sedimentation Reduction	-	-	1,006	1,469	TBD	TBD
Y1316	Improved Materials for Real Property Management	-	-	-	1,198	TBD	TBD
Y1606	New Construction Technology/Tools	-	-	1,796	2,058	TBD	TBD

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element addresses threats to operational readiness which arise from the unreliability of the Navy's aging physical plant (two-thirds of facilities are over 30 years old) and the high cost to maintain and construct shore facilities (approximately 1 1/2 billion dollars/year). It also addresses improvements to the Naval Construction Force capability to operate in an advanced base scenario. Since the life span of facilities exceeds that of several generations of ships and aircraft, future shore facilities must be sufficiently flexible and adaptable to provide cost effective support for new weapons systems. This element provides for the development of a number of validated facility concepts, components and equipment, materials, and procedures essential to the improvement of the effectiveness and economy of the Military Construction Program and the operation and maintenance of facilities in peacetime and in contingency situations. The program consists of the following developments: (1) Explosives Safety of Waterfront Facilities - Improvements in facilities hardening technology and siting criteria will be test validated to improve Fleet readiness while in-port and to reduce programmed Military Construction costs for the design of new waterfront facilities and correction of existing safety violations. (2) Pier Systems for the Fleet of the 1990s - Improvements in planning and design criteria will increase Fleet readiness and provide more capable and cost effective pier systems. (3) Specialized Inspection Systems - Improved equipment and techniques will be developed to quickly assess the readiness of critical operational facilities and avoid unexpected failures of these facilities due to hidden defects. (4) Physical Security Systems - Improved security planning criteria, attack resistant hardware systems and the availability of Navy-wide technical support in security engineering will reduce high Navy losses from crime and vandalism and minimize disruptions to Fleet repair schedules and deployment plans. (5) Expeditionary Maintenance Hangar - A rapidly erectable, relocatable maintenance hangar will be developed for forward based ASW patrol and other aircraft. (6) Dredge/Sedimentation Reduction - Sedimentation barrier system will be developed for preventing siltation in Navy harbors/berths and reducing maintenance dredging costs by half. (7) Improved Materials for Real Property Maintenance - Performance specifications and selection methods will provide longer lasting and less expensive materials for use in the aggressive Navy

Program Element: 63725N
DoD Mission Area: 235 - Naval Warfare Support

Title: Facilities Improvement
Budget Activity: 4 - Tactical Programs

waterfront environment. (8) New Construction Technology/Tools - Expedient construction and repair techniques and equipment hardening methods will be developed to allow the Naval Construction Force to operate in a high-threat, post-attack environment.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Prepare system specifications for the Naval Ordnance Hazards and Risk Management program to assess risk to facilities, Naval personnel, and the public at Navy bases due to ordnance logistics operations. Develop failure criteria for reinforced concrete members exposed to explosive effects. Complete evaluations of alternative pier designs and new shore-to-ship steam and electrical power delivery systems. Develop equipment and techniques for assessing facility conditions in waterfront structures and underground pipelines. Develop method to analyze physical security requirements and determine the proper mix of protection methods (guard force, intrusion alarms, etc.). Fabricate three test arches and connecting roof panels for an expeditionary maintenance hangar. Initiate development of sediment control systems to reduce deposition of suspended sediments in berthing areas of Navy harbors. Test runway repair techniques to establish P-3 aircraft compatibility and operational limitations. The increase in FY 1983 over FY 1982 is due to the addition of Projects Y1077, Y1315 and Y1606 in FY 1983. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are: 1) the decrease of $28 in FY 1981 is due to Navy application of a Congressionally approved reduction for inflation; 2) the $553 decrease in FY 1982 is the result of an overall Navy budget reduction and a reduction for inflation; and 3) the total decrease of $3,490 for projects Y0995, Y1077, Y1315, and Y1316 in FY 1983 is the result of a Navy reduction to accommodate an overall reduction in RDT&E; and (4) the addition of project Y1606 accounts for an increase of $1,796 in FY 1983.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	567	3,258	3,747	7,613	Continuing	Continuing
Y0995	Naval Facilities Systems	567	3,258	3,747	3,775	Continuing	Continuing
Y1077	Expeditionary Maintenance Hangar	-	-	-	1,192	TBD	TBD
Y1315	Dredge Sedimentation Reduction	-	-	-	1,578	TBD	TBD
Y1316	Improved Materials for Real Property Management	-	-	-	1,068	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 63725N
DoD Mission Area: 235 - Naval Warfare Support

Title: Facilities Improvement
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: DoD Explosive Safety Quantity Distance standards require minimum distances between ordnance loads (on ships or land) and occupied waterfront facilities where explosives are handled. These standards have created high Military Construction costs for correcting existing safety violations and building new facilities. As an example, over $40 million is required to correct 8 existing safety violations at Naval Weapons Station, Concord, CA. Furthermore, the Explosive Safety Quantity Distance standards reduce explosive storage capacities to less than 50 percent of design capabilities, which severely degrades Fleet readiness to respond from at-berth posture. This program will adapt and validate technological advances in the theory of design for hardening facilities, develop risk decision models for correcting safety waivers and identifying optimum solutions for constructing facilities which provide ordnance support to ships.

(U) The Navy now has a shortage of modern waterfront berthing facilities with sufficient depths of water and shore-to-ship utilities support and many of the facilities are in poor condition. In late 1981, an analysis was made of the capabilities of the major west coast homeports to berth the ships contemplated in the planned shipbuilding program through 1990. This study identified a major requirement for new construction totalling over $1 billion through FY 1990. This element will introduce performance, reliability, maintainability, and cost effective data on alternative construction concepts, techniques and materials for incorporation into the planning and design of new waterfront operational facilities.

(U) The Navy allocates limited Operations and Maintenance resources to maintain and repair facilities based on the actual condition of the facility and its related potential impact on Fleet operational readiness. Current inspection capability is based largely on visual methods and is not adequate to properly assess the condition of critical facilities. This element will develop inspection equipment and techniques to quantitatively measure the actual condition of facilities and determine the impact of their condition on operational readiness. The effort focuses on waterfront structures, airfield pavements, fuel storage, and distribution systems and utilities.

(U) The increasing threat posed by the sophistication, skill, and tempo of terrorist groups together with high Navy losses due to crime and vandalism (estimated at over $700 million per year) have emphasized the need for upgrading security at Navy activities. This element will develop improved security planning criteria, hardware, and techniques for incorporation into Navy facilities and the capability for Navy-wide technical support in security engineering and security related information.

(U) CINCPACFLT, CINCLANTFLT, CINCUSNAVEUR, and the Joint Contingency Construction Requirements Study (Report Number JCSM 133-77) all established requirements for the availability of an aircraft maintenance hangar within 30 days after initiation of hostilities. The Operational Requirement (OR Y1077) establishes program objectives for a rapidly erectable, containerized hangar for housing two P-3 aircraft and one or more CH-46/CH-53E aircraft. The all climate hangar is to be erectable in five days by six men using hand tools and manually operated winches and erection towers.

Program Element: 63725N
DoD Mission Area: 235 - Naval Warfare Support

Title: Facilities Improvement
Budget Activity: 4 - Tactical Programs

(U) New or enhanced capabilities for expedient Naval Construction Force construction methods and equipment will be developed. These will allow the Naval Construction Forces to operate more effectively in a high-threat, post-attack environment. Methods will be developed to restore bomb-damaged runways to operational status within hours. More efficient methods of repairing utilities will be investigated. Lightweight structural components for use in bridging damaged piers and offshore cargo transfer facilities will be developed. Techniques for the rapid repair of the offshore bulk fuel transfer system will be developed. Underwater construction systems development will include sea water hydraulic power sources and tools, sensors to locate and track cables, a diver tracking/positioning system, and precisely controllable lift modules.

(U) Rapidly accumulating sedimentation deposits interfere with access to submarine and carrier berths at six major Navy ports. Additionally, dredging costs to maintain these berths has increased ten fold since 1971 due to environmental constraints. Sedimentation barrier systems both passive (trench and curtain) and active (water jets) will be developed which will increase Fleet readiness and reduce annual dredging costs of $30 million by half.

(U) Less expensive more durable materials are being developed by industry and government activities that can minimize maintenance and new construction costs. However, due to the lack of data and confidence in these relatively untested materials, facilities designers are reluctant to incorporate these materials into field use. The materials effort will provide validated criteria for selected materials for the preparation of specifications related to facilities.

(U) RELATED ACTIVITIES: Navy Exploratory Development on explosives safety, port systems, non-destructive evaluation and inspection technology, physical security, expeditionary maintenance hangar, and new construction technology/tools (PE 62760N, Logistics Technology). Materials exploratory development program (PE 62761N, Materials Technology). Dredge Sedimentation Reduction (PE 62765N, Energy and Environmental Protection Technology).

(U) WORK PERFORMED BY: Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Surface Weapons Center, White Oak, Silver Spring, MD and Dahlgren, VA; Naval Weapons Center, China Lake, CA; TRW Defense and Space Systems, Redondo Beach, CA; Army Ballistics Research Laboratory, Aberdeen, MD; Mission Research Corporation, Santa Barbara, CA; EG&G Washington Analytical Services Center, Inc., Rockville, MD; J.H. Wiggins Co., Los Angeles, CA; Flow Industries, Kent, WA; Stanford Research Institute, Palo Alto, CA; Southwest Research Institute, San Antonio, TX; Scripps Institute of Oceanography, La Jolla, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Prepared Mission Element Need Statement for the Explosives Safety Naval Ordnance Hazards and Risk Mangement Program. Conducted half-scale tests of box-shaped ordnance magazines. Compiled data on blast effects on buildings and hazards associated with resulting building debris and fragments. Developed probabilistic methodology for estimating damage to structural components.

Program Element: 63725N
DoD Mission Area: 235 - Naval Warfare Support

Title: Facilities Improvement
Budget Activity: 4 - Tactical Programs

(U) Continued efforts to define ship steam and electrical power usage while docked at piers. Developed operational criteria for separators as a technique for providing clean, dry steam to Navy ships. Initiated effort to develop innovative pier designs for surface combatants which will impact on Milcon Project P-135 at Charleston, SC.

(U) Developed equipment for assessing the condition of wire rope for crane cables. Prepared operational procedures for testing aircraft power check tie-downs. Developed prototype cavitating waterjet system for underwater cleaning of piles.

(U) Developed window barrier design concepts for resistance to forced entry attacks by portable hand, thermal, and power tools. Developed new designs which provide greater resistance to forced entry for magazines and intermediate size doors.

2. (U) FY 1982 Program: Complete test validation of design criteria for failure deflection of reinforced concrete subjected to blast. Develop design specification for Ordnance Hazard and Risk Analysis computer program. Begin development of new design standards for blast resistant steel doors and windows.

(U) Complete field measurement program to determine ship cold-iron requirements for steam. Continue investigations of alternate concepts for pier configuration and fender systems. Continue development of new shore-to-ship delivery systems for electrical power and steam. Evaluate the application of steam-condensate return systems for Navy piers.

(U) Initiate effort to develop prototype equipment for detecting underground obstacles to construction. Continue field evaluation of equipment for inspecting underwater wood, concrete, and metal structures. Continue the development of underwater cleaning techniques for piles. Complete development of a roofing inspection system.

(U) Continue development of a method for analyzing physical security requirements and specifying the proper mix of protection methods (guard force, intrusion alarms, and attack resistant structures) for protecting a given asset. Continue validation tests of intermediate size doors and window barriers. Initiate validation tests of magazine door designs.

3. (U) FY 1983 Planned Program: Complete development specifications for the Ordnance Hazard and Risk Analysis computer program to assess risk to facilities from ordnance logistics systems. Complete tests to validate criteria for blast damage to facilities and evaluate debris hazards from explosions inside buildings. Complete measurements of ship cold-iron requirements relating to electrical power. Provide engineering and economic data on alternative concepts for providing clean, dry steam and adequate saltwater to berthed Navy Fleet vessels. Continue investigation of alternative pier configurations, including multi-level deck and floating piers. Continue investigation of alternative fender systems. Develop recommendations regarding steam condensate system. Continue work on shore-to-ship steam and electrical power delivery systems.

Program Element: 63725N
Title: Facilities Improvement
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) Continue development of systems to inspect underwater wood, concrete, and metal structures. Initiate development and evaluation of prototype equipment and techniques to inspect waterfront earthwork and fleet moorings. Initiate investigation of corrosion protection/prevention of petroleum, oil, and lubricant tanks and distribution systems. Complete evaluation of underwater pile cleaning system.

(U) Continue development of methodology to analyze physical security requirements and to specify a cost effective mix of protection methods (guard forces, intrusion alarms, etc.). Recommend specifications for intermediate size doors and window barriers. Continue validation testing of new concepts for magazine doors. Continue development of improved frangible roofs and walls.

(U) Initiate field tests of sediment control systems to reduce deposition of suspended sediment at Navy piers. Both passive (curtain) and active (waterjet) systems will be evaluated at Mare Island Naval Shipyard, Norfolk Naval Base, and Charleston Naval Station.

(U) Finalize engineering design for the P-3 hangar and fabricate components necessary to erect three full arches. The methodology for erection (techniques, tools, and equipment) will be specified and the erection tools and equipment fabricated. Test plan for FY 1984 testing will be complete.

(U) Test runway repair techniques to establish P-3 compatibility and operational limitations. Develop packaging methodology for containerization of essential elements of the Naval Construction Force table of allowance.

4. (U) FY 1984 Planned Program: Award contract for the development of Ordnance Hazard and Risk Analysis computer program. Complete design criteria for facilities subject to blasts and explosions.

(U) Complete investigation of alternative pier configurations and fender systems. Complete work on shore-to-ship steam and electrical power delivery systems. Continue investigation of alternative methods to provide fuel, petroleum, and cargo/weight handling services to Navy vessels.

(U) Complete development of inspection system for underwater wood, concrete, and metal structures. Continue work on corrosion protection of petroleum, oil, and lubricant tanks and distribution systems. Complete effort on fleet moorings and earthwork.

(U) Prepare recommendations of methods to analyze physical security requirements and to specify protection mix. Complete validation of new magazine door concepts. Complete development of improved frangible roofs and walls.

Program Element: 63725N
DoD Mission Area: 235 - Naval Warfare Support

Title: Facilities Improvement
Budget Activity: 4 - Tactical Programs

(U) Three hangar arches will be erected at a suitable location for initial evaluation of the expeditionary maintenance hanger design. Instrumentation will be installed as required to measure forces on the structure and arch deflection. The supporting base plates and anchoring system will be evaluated. The erection towers, tools, and winches will be evaluated. Specifications for the procurement of a complete hangar will be developed. This will include new designs for main entrance closures, utilities, and side entrances.

(U) Field test sediment control systems at Naval Station, Norfolk, VA (north side of pier 12) and Naval Station Charleston (floating dry dock), and test new sedimentation monitoring system.

(U) Initiate field tests of new materials for petroleum, oil, and lubricant tanks, roofing systems, and waterfront concrete.

(U) Validate runway repair surface roughness criteria for P-3 aircraft. Develop electrohydraulic seawater power convertor for underwater construction/repair. Demonstrate performance of prototype diver operated cable/pipeline tracking system. Develop technique for rapid repair of offshore cargo/fuel transfer systems.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63726N
DOD Mission Area: 262-Sealift

Title: Merchant Ship Naval Augmentation Program
Budget Activity: 4-Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,764*	6,757*	5,773	5,690	Continuing	Continuing
S0378	Merchant Ship Naval Augmentation Program	2,764*	6,757*	5,773	5,690	Continuing	Continuing

* In Program Element 63705N

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Merchant Ship Naval Augmentation Program will develop a means of rapidly providing capabilities in merchant ships to enable them to augment naval underway replenishment vessels in time of war, during contingencies, and during surge requirements. In general, the system would provide for the basic functions of cargo stowage and accessibility, lateral and vertical movement of cargo within the merchant ship, and the transfer of cargo to Navy ships. Other support roles contained in the operational requirement, including amphibious resupply, troop life, hospital/repair services, towing/diving and salvage, mine countermeasure, heavy lift capability, and other small auxiliary augmentation, will be analyzed and evaluated for future program support.

(U) *BASIS FOR FY 1983 RDT&E REQUEST:* In FY 1981 the breakbulk consolidation system was completed and tested at sea in Joint Test and Evaluation with Commander in Chief, U.S. Atlantic Fleet. The Procurement Specification is completed and procurement will start in FY 1982. RDT&E program will develop vertical access, horizontal access and secondary components to enable container ships to operate in support of the fleet in both the Underway Replenishment and Sealift roles. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands)The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this summary are as follows: +$9 in FY 1981, -$102 in FY 1982 and -$262 in FY 1983 are the result of refinement in cost estimates and part of overall Navy budget reductions.

Program Element: 63726N
DOD Mission Area: 262-Sealift

Title: Merchant Ship Naval Augmentation Program
Budget Activity: 4-Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	2,755	6,859	5,952	Continuing	Continuing
S0378	Merchant Ship Naval Augmentation Program	0	2,755	6,859	5,952	Continuing	Continuing

NOTE: This project was in the Program Element 63705N Descriptive Summary in FY 1982.

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN Funds (Sealift Support Equipment)	-	5,944	22,284	24,700	Continuing	Continuing

Program Element: 63726N
DoD Mission Area: 262 - Sealift

Title: Merchant Ship Naval Augmentation Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program was originated in response to a need which required that methods to employ modern commercial ships (particularly containerships) be developed to support Navy ships at sea. The Merchant Ship Naval Augmentation Program will develop modular components which will be utilized to temporarily modify merchant ships for Fleet support roles to augment Fleet resources when needed. Modular elevators, container unstuffing devices, and modified replenishment at sea systems and other equipment will be developed to provide commercial ships with the capability to augment Naval support forces in the roles of underway replenishment, hospital facilities, mine countermeasures, diving and salvage, heavy lift and amphibious resupply.

(U) RELATED ACTIVITIES: Container Offloading and Transfer System, PE 63719N; USMC Field Logisitic System, PE 63635M; Exploratory Development on Navy/Marine Corps Amphibious and Advanced Base Petroleum, Oil and Lubricants System (1975-1990), PE 62760N.

(U) WORK PERFORMED BY: In-House: Naval Ship Weapons System Engineering Station, Port Hueneme, CA; Naval Ocean Systems Center, San Diego, Calif; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Weapons Handling Center, Earle, NJ; Naval Coastal Systems Center, Panama City, FL. Contractors: Presearch, Inc. Arlington, VA; EG&G Inc., Gaithersburg, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Utilizing Exploratory Development funds, a program has been documented and work on several modular components has been initiated. Planning for a full scale feasibility demonstration as a joint task with CINCLANTFLT was started. Ashore test facilities have been designed and partially constructed. Conceptual design analysis for cargo movement and handling within the total Merchant Ship System was initiated. In FY 1981 the program was initiated in Advanced Development. Initiated concept analysis and preliminary design of general support (hotel) facilities and underway replenishment mission modules. Began concept analyses of other missions to document development requirements. Planned and execute a joint demonstration test with Commander in Chief, U.S. Atlantic Fleet.

2. (U) FY 1982 Program: Initiate the development of modular sending rig, habitability modules, dunnage systems access modules components, prepare performance specifications for merchant ship/Navy ship interface systems and initiate the planning of the shore phase of the test program. Develop all planning documentation for the procurement program to be initiated in mid FY 1982. Develop plan for joint Commander in Chief, Atlantic/Naval Sea Systems Command Test and Evaluation in Mediterranean and Indian Ocean using merchant ship in FY 1983.

3. (U) FY 1983 Planned Program: Continue the development of sending, rig, heavy lift components, habitability and access modules components, conduct shore test of hardware items, and complete test. Major emphasis will be on using container ships in sealift and underway replenishment. Repair, safety, and survivability modules will also be initiated. Continue phasing of RDT&E

completed components into OPN program. Complete Test and Evaluation of breakbulk ship in Fleet support role in Mediterranean and Indian Ocean.

4. (U) FY 1984 Planned Program: Test sending rig in Joint Logistics Over The Shore-II operation. Test access components and receive Coast Guard and American Bureau of Shipping certification.

5. (U) Program to Completion: Complete development and operational testing and obtain Approval for Service Use for modular components that will provide commercial ships with the capabilities to perform Naval roles such as underway replenishment, hospital services, troop lift, repair salvage, towing, heavy lift, amphibious resupply and countermeasures.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Element:63729M Title: Marine Corps Combat Services Support (Advanced)
sion Area: 216-Intra Theater Land Transportation Budget Activity: 4 - Tactical Programs

ESOURCES (PROJECT LISTING): (Dollars in Thousands)

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	1,003	3,122	4,410	5,931	Continuing	Continuing
Electronics Maintenance Complex	-	844	427	361	Continuing	Continuing
Power Source Systems	60	375	352	375	Continuing	Continuing
Tactical Motor Transport Vehicles (Advanced)	273	962	1,030	1,004	Continuing	Continuing
Mine and Boobytrap Countermeasures (Advanced)	100	232	1,988	3,456	Continuing	Continuing
Combat Logistics Support (Advanced)	397	415	342	378	Continuing	Continuing
Aviation Support Material and Equipment	173	294	271	357	Continuing	Continuing

RIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides RDT&E funds for the advanced development of Corps equipment needed for the supply, maintenance, motor transport, and service support of operating forces.

ASIS FOR FY 1983 RDT&E REQUEST: Provide the Fleet Marine Force (FMF) with an electronics maintenance complex configured standard Marine Corps shelter system which is compatible with Merchant Container shipping, improved hardware and ques in battery and other direct current power sources, tactical and logistic vehicle support, countermeasures for anti- nd personnel mines, replacement engineer equipment and combat service support water and bulk fuel systems, and support ent for aviation units. The increase in FY 1983 over FY 1982 is for advanced development of the warhead and weapon er in the Mine and Boobytrap Countermeasures project. As this is a continuing program, the above funding includes outyear tion and encompasses all work or development phases now planned or anticipated through FY 1984 only.

OMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the 2 Descriptive Summary and that shown in this Descriptive Summary are as follows: Electronics Maintenance Complex: In FY the increase of 98 will be used to conduct initial development and operational testing and evaluation.

Program Element:63729M
Title: Marine Corps Combat Services Support (Advanced)
DoD Mission Area: 216-Intra Theater Land Transportation
Budget Activity: 4 - Tactical Programs

Power Source System: The 228 decrease in FY 1981 was due to reducing and realigning the scope of the project to support development of primary and secondary power sources for the Digital Communications Terminal and Modular Universal Laser Equipment. Mine and Boobytrap Countermeasures (Advanced): FY 1983 funding is increased by 1,594 to provide for advanced development of the warhead and weapon launcher. Tactical Motor Transport Vehicles (Advanced): The decrease of 709 in FY 1981 was due to forward funding of 300 in FY 1980 for the High Mobility Multipurpose Wheeled Vehicle and a reduction in scope of RDT&E efforts which resulted in a decrease of 409. The 709 was reprogrammed to higher priority Marine Corps efforts. All other changes are due to refinements of cost including escalation.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,978	2,070	3,160	2,785	Continuing	Continuing
C0050	Test Equipment Development	198	*	*	*	*	*
C0051	Electronics Maintenance Complex	99	-	855	329	Continuing	Continuing
C0063	Power Source Systems	89	288	379	363	Continuing	Continuing
C0075	Tactical Motor Transport Vehicle (Advanced)	1,801	982	974	1,066	Continuing	Continuing
C0077	Mine and Boobytrap Countermeasures (Advanced)	-	183	225	394	Continuing	Continuing
C0078	Combat Logistics Support (Advanced)	388	397	420	353	Continuing	Continuing
C0082	Aviation Support Material and Equipment	285	220	297	280	Continuing	Continuing
C0939	Marine Corps Container System	118	*	*	*	*	*

* Funded under 64717M, Marine Corps Combat Services Support.

Program Element: 63729M
Title: Marine Corps Combat Services Support (Advanced)
DoD Mission Area: 216-Intra Theater Land Transportation
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS;

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	Procurement, Marine Corps						
C0075	5/4 Ton Truck	-		40,382	68,841	168,281	277,504
	(Quantity)	-		(1,378)	(2,409)	(5,364)	(9,151)
	Truck, Tractor, 5 Ton	8,263	4,549	1,356		Continuing	Continuing
	(Quantity)	(132)	(67)	(18)		TBD	TBD
	Truck, Cargo, 5 Ton	70,337	48,534	63,817	47,652	Continuing	Continuing
	(Quantity)	(1,131)	(689)	(842)	(580)	TBD	TBD
	Lubrication and Service		875	79		Continuing	Continuing
	(Quantity)		(34)	(3)		TBD	TBD
	Steam Cleaner	279	537	679	684	Continuing	Continuing
	(Quantity)	(139)	(72)	(89)	(85)	TBD	TBD
C0079	Tractor, Medium, Full Track		13,209	30,196	370	Continuing	Continuing
	(Quantity)		(121)	(216)	(3)	TBD	TBD
	Scraper, Wheeled			7,798	8,411	Continuing	Continuing
	(Quantity)			(42)	(42)	TBD	TBD
	Lightweight Amphibious Container Handler	5,719					5,719
	(Quantity)	(56)					(56)

List refined for correlation with Procurement Marine Corps Exhibit P-1.

Program Element:63729M
DoD Mission Area: 216-Intra Theater Land Transportation

Title: Marine Corps Combat Services Support (Advanced)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Electronics Maintenance Complex provides a maintenance facility housed in standard Marine Corps shelters and is compatible with merchant container shipping. Power Source Systems encompasses the development of high capacity, all temperature primary and secondary batteries and thermoelectric, thermionic and solar power sources. Tactical Motor Transport Vehicles (Advanced) provides for the optimum mix of tactical motor transport and support equipments for Fleet Marine Force employment, provides for the transportation of dimensionally standard loads in view of containership realities of the midrange period, reduces the types of vehicles and consequent maintenance and concomitant personnel. Mine and Boobytrap Countermeasures involves the development of hardware and systems to provide the Fleet Marine Forces with a countermine capability for an amphibious assault. Combat Logistics Support (Advanced) comprises engineer earthmoving equipment and material handling equipment; water purification dispensing and handling equipment, bulk fuel storage and dispensing equipment; also, protective construction for bunkering of troops and equipment; mobile maintenance shops and electrical distribution systems. Aviation Support Material and Equipment supports improvements to aviation capabilities by providing for a Vertical/Short Take-off-Landing (V/STOL) Ski Jump, for example, but primarily by monitoring and participating in other Service efforts in the developments of Control and Landing Systems, Air Control Beacons, and Approach Systems.

(U) RELATED ACTIVITIES: U.S. Army PE 63104A, on Fuels/Lubricant Development; U.S. Army PE 63210A on Aircraft Power/Propulsion; U.S. Army PE 64204A of Air Mobility Support Equipment; U.S. Army PE 63602A and 63606A on Land Mine Warfare; U.S. Army PE 63621A on Vehicle Componentry.

(U) WORK PERFORMED BY: In-house: Army Tank and Automotive Command, Warren, MI; Marine Corps Logistics Base, Albany, GA: Naval Sea System Command, Washington, DC; Naval Civil Engineering Laboratory, Port Hueneme, CA; Naval Coastal Systems Center, Panama City, FL. Contractors: Brunswick Corporation, Marion, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS;

1. (U) FY 1981 and Prior Accomplishments: Initial design concepts for the Electronics Maintenance Complex were developed in FY 1980, FY 1981 was unfunded due to higher priority RDT&E projects in other program elements. The development of prototype source for non-dangerous nickel/cadmium batteries continued and prototypes for a manpacked solar power unit were investigated. Industry was solicited for commercial items to replace Marine Corps logistics vehicles and a prototype concept for a heavy tractor and trailer was selected. Developmental and Operational Testing (DT/OT) of the heavy tractor and trailer, now referred to as the Logistics Vehicle System, and Military Motorcycle was completed. The prototype minefield breaching kit for the Landing Vehicle Tracked 7A1 Assault Amphibian vehicle transitioned to engineering development. Initial design concepts for the Catapult Launched Fuel Air Explosive mine countermeasures system were investigated. Commercial earthmoving bulldozers and scrapers were tested and suitable replacements were recommended for procurement. The RDT&E effort on the Lightweight Amphibious Container Handler was completed and a procurement package was prepared. The monitoring of Air Force development efforts in Naval Gunfire application to Forward Air Controller Beacon continued. A "Ski Jump" platform was constructed to evaluate AV-8A aircraft load carrying increases. Habitability modules for use aboard commercial/amphibious ships and in the field were "bread boarded" at Navy laboratories.

Program Element:63729M Title: Marine Corps Combat Services Support (Advanced)
DoD Mission Area: 216-Intra Theater Land Transportation Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: The nickel/cadmium battery development (expanded to include in-service equipment as well as radio sets under development) will be conducted at Army Labs and development of manpacked solar power units will continue. Prototype Logistics Vehicles System trucks will undergo operational testing and the support of the Army tactical vehicle programs will continue. Approval for Service Use and transition to production of the Logistics Vehicle System is expected. Developmental and Operational testing of variants of the Logistics Vehicle System and the High Mobility Multipurpose Wheeled Vehicle will continue. The warhead and launcher prototype development of the Catapult Launched Fuel Air Explosive mine countermeasures system will be started. Developmental Test/Initial Operational Test and Evaluation will be continued on the subsystems for Marine Air Traffic Control and Landing System. Testing and evaluation of commercial small bulldozers and excavators for suitability as replacement engineer equipment will be accomplished. Developmental testing and evaluation of new state-of-the-art bulk fuel storage, handling and distribution equipment will continue.

3. (U) FY 1983 Planned Program: The Electronics Maintenance Complex program will continue with Development and Operational Testing of configured prototype shelters. New air compressors will be evaluated. Alternate power sources including hand crank generators for communications-electronics equipment will continue to be identified. Interservice coordination of Tactical Vehicle Fleet RDT&E will continue. The High Mobility Multipurpose Wheeled Vehicle will transition to production development. Evaluation of the Catapult Launched Fuel Air Explosive Countermine system and emphasis in Army efforts on fuel air explosives for minefield neutralization will continue. The combat service support items will transition into Program Element 64717M when appropriate and commercial engineer equipment will continue to be evaluated. The Initial Operational Test and Evaluation of the Marine Air Traffic Control and Landing System will continue.

4. (U) FY 1984 Planned Program: The development effort as described will continue as necessitated by outyear requirements in the area of combat services support (Advanced Development).

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63730M
Title: Marine Corps Intelligence/Electronic Warfare System (Advanced)
DoD Mission Area: 373-Tactical Surveillance, Recce and Target Acquisition
Budget Area: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8	2,209	7,024	6,242	TBD	TBD
C0066	Non-Communication Electronic Countermeasures System (NONCOMM ECM)	-	46	1,582	*	*	*
C0067	Communication Electronic Countermeasures System	3	-	-	-	-	3
C0936	Marine Corps Electronic Warfare Simulation Suite (MCEWSS)	5	551	1,340	418	TBD	TBD
C0937	Mobile Electronic Warfare Support System	-	834	**	**	**	**
C1296	All-Source Imagery Processor (ASIP)	-	778	1,649	*	TBD	TBD
C1297	Remotely Monitored Battlefield Sensor System (REMBASS)	-	-	1,180	1,206	TBD	TBD
C1421	Lightweight Battlefield Surveillance Radar (LBSR)	-	-	489	2,164	TBD	TBD
C1422	Lightweight Seismic Acoustic/Passive Device (LSAPD)	-	-	784	2,454	TBD	TBD

* Funded under Program Element 64718M, Marine Corps Intelligence/Electronic Warfare Systems (Engineering)
** Funded in Program Element 64718M, Marine Corps Intelligence/Electronic Warfare Systems (Engineering) in FY 1983 and subsequent years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides RDT&E funds for the advanced development of Marine Corps intelligence and electronics warfare equipment and systems required for the support of operating forces.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Non-Communication Electronic Countermeasures System (NONCOM ECM): Continue advanced joint development effort with another service. Marine Corps Electronic Warfare Simulation Suite: Complete development of prototype Electronic Warfare Simulation Suite. All Source Imagery Processor (ASIP): Continue construction of prototype Advanced Development Model. Remotely Monitored Battlefield Sensor System: Begin advanced development of an air delivered sensor which will be compatible with the Air Delivered Remotely Monitored Battlefield Sensor System. Lightweight Battlefield Surveillance Radar: Initiate joint advanced development program with another service. Lightweight Seismic Acoustic/Passive Device (LSAPD): Begin advanced development effort. Establish joint program with another service. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 63730M

Title: Marine Corps Intelligence/Electronic Warfare System (Advanced)

DoD Mission Area: 373-Tactical Surveillance, Recce and Target Acquisition

Budget Area: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: Marine Corps Electronic Warfare Simulation Suite (MCEWSS): FY 1981 decrease of 1200 is due to restructure and redirection of the program to a more affordable and less technologically sophisticated system. FY 1983 increase of 1340 is due to redefined prototype development. All Source Imagery Processor (ASIP): FY 1983 increase of 482 above the previous estimate is due to the purchase of additional Advance Development Model hardware and software and for the capability demonstration with respect to soft copy exploitation of near real time Side Looking Airborne Radar and national imagery products. Lightweight Battlefield Surveillence Radar: FY 1982 decrease of 357 is due to Congressional action as a result of delay in establishing a joint program with another service. Lightweight Seismic Acoustic/Passive Device (LSAPD): FY 1982 decrease of 301 is due to Congressional action as a result of delay in transition from exploratory devleopment. Other changes are the result of the refinement of cost estimates including inflation.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	-	1,205	2,902	4,117	Continuing	Continuing
C0066	Non-Communication Electronic Countermeasures System	-	-	53	1.636	Continuing	Continuing
C0936	Marine Corps Electronic Warfare Simulation Suite (MCEWSS)	-	1,205	558	-	-	1,763
C0937	Mobile Electronic Warfare Support System (MEWSS)	-	-	845	*	*	*
C1296	All-Source Imagery Processor	-	-	788	1,167	Continuing	Continuing
C1421	Lightweight Battlefield Surveillance Radar	-	-	357	505	Continuing	Continuing
C1422	Lightweight Seismic Acoustic/Passive Device	-	-	301	809	Continuing	Continuing

* FY 1983 and subsequent funding is in PE 64718M, Marine Corps Intelligence/Warfare Systems (Engineering).

(U) OTHER APPROPRIATION FUNDS: TBD

Program Element: 63730M

Title: Marine Corps Intelligence/Electronic Warfare System (Advanced)

DoD Mission Area: 373-Tactical Surveillance, Recce and Target Acquisition

Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Marine Corps Electronic Warfare Simulation Suite: The funds that were identified for FY 1981 support were reassigned to requirements of a higher priority. An interim electronic warfare training capability was fielded during FY 1981 using "off-the-shelf" equipment. The final Electronic Warfare Simulation Suite will use the current capability equipment that has been fielded as an integral element. Upon completion, this simulation suite will have the capability to exercise all currently used portions of the electromagnetic spectrum. Non-Communications Electronic Countermeasure System: This system will provide the capability to jam and/or deceive hostile non-communications emitters such as counter-mortar/counter-battery radars and fire control radars. Mobile Electronic Warfare Support Suite: Consists of an armored vehicle configured with electronic countermeasures equipment. It will provide Marine ground forces with a system capable of conducting active electronic warfare support during the amphibious assault and subsequent operations ashore. All-Source Imagery Processor: This device will be used to exploit/analyze multi-sensor digital imagery selectively printed as hard copy. The processor will replace the current Imagery Interpretation Subsystem of the Marine Air Ground Intelligence System which only has the capability of analyzing hard copy imagery. The Lightweight Battlefield Surveillance Radar is a late 1980's replacement for the AN/PPS-15 ground surveillance radar (GSR). The Lightweight Seismic Acoustic Passive Device is a seismic/acoustic sensor that can detect and classify artillery, tanks and low flying aircraft.

(U) RELATED ACTIVITIES: Other Service electronic warfare and intelligence systems development.

(U) WORK PERFORMED BY: Non-Communications Electronic Countermeasures System: To be determined. Marine Corps Eelctronic Warfare Simulation Suite: In-house: Naval Training Equipment Center, Orlando, Florida; Mobile Electronic Warfare Support System: To be determined. Remotely Monitored Battlefield Sensor System: To be determined. Lightweight Seismic Acoustic Passive Device and Lightweight Battlefield Surveillance Radar: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Marine Corps Electronic Warfare Simulation Suite: The first of three electronic warfare vans was fielded.

2. (U) FY 1982 Program: Non-Communications Electronic Countermeasures System: Establish a joint advanced development program with another service. Marine Corps Electronic Warfare Simulation Suite: The two remaining electronic warfare vans will be fielded. All three vans will be tested and initial evaluation of requirements necessary to expand the vans' capability will be conducted. All Source Imagery Processor: Contractor efforts leading to joint advanced development.

Program Element: 63730M

Title: Marine Corps Intelligence/Electronic Warfare System (Advanced)

DoD Mission Area: 373-Tactical Surveillance, Recce and Target Acquisition

Budget Area: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Non-Communications Electronic Countermeasures System: Complete building and testing of the advanced development model. Marine Corps Electronic Warfare Simulation Suite: The engineering development of a simulation suite with expanded capability will be conducted. Testing will begin. All Source Imagery Processor: Continue joint advanced development. Lightweight Battlefield Surveillance Radar: Commence joint advanced development. Remotely Monitored Battlefield Sensor System: Begin development of an air delivered sensor. Lightweight Seismic Acoustic Passive Device: Begin advanced development.

4. (U) FY 1984 Planned Program: Continue FY 1983 development. The increase of 1675 in Project C1421, from FY 1983 to FY 1984 is due to a one year delay in establishing a joint program. The increase of 1670 in Project C1422 from FY 1983 to FY 1984 is due to development of hardware and software for the advanced development model.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63731M
Title: Marine Corps Command/Control/Communications Systems (Advanced)
DoD Mission Area: 351 - Land Warfare
Budget Area: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	283	1,490	2,753	494	Continuing	Continuing
C0064	Marine Integrated Personnel System (MIPS)	-	1,341	2,108	0	0	3,449
C0935	Real-Time Financial and Manpower Management Information System (REAL-FAMMIS)	283	149	147	0	0	1,416
C1599	Deployed Automatic Data Processing Equipment (ADPE) System Interface	-	-	498	494	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides funds for the advanced development of all Marine Corps Command, Control and Communications (C3) equipment and systems required for the conduct and support of combat operations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Marine Integrated Personnel System: The operational concept for the Marine Integrated Personnel System is to be staffed and the approved configuration adopted. Begin analysis and design of automated data processing requirements. Real-Time Financial Management Information System: Commence efforts for Integrated Logistics Support Plan concept for the approved system configuration. The analysis and design of automated data processing requirements will begin. Deployed Automatic Data Processing Equipment (ADPE) System Interface: Design, develop, test and interface between the Automatic Data Processing Equipment and the Management Information System (MIS) on board the Amphibious Assault Ship (LHA) and with the U-1500 computer series within the Marine Aircraft Wings (MAWs). The U-1500 supports the aviation maintenance and management systems with the Marine Aircraft Wings. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflect a decrease of $19 in FY 1982 escalation. Research and development effort for Real Time Financial and Manpower Management Information System terminates in FY 1983. The Deployed Automatic Data Processing Equipment (ADPE) System Interface initiates in FY 1983. Other minor changes are due to refinement of cost estimates including inflation.

Program Element: 63731M
DoD Mission Area: 351 - Land Warfare

Title: Marine Corps Command/Control/Communications Systems (Advanced)
Budget Area: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	163	286	1,509	2,333	Continuing	Continuing
C0064	Marine Integrated Personnel System (MIPS)	-	-	1,359	2,182	Continuing	Continuing
C0935	Real-Time Financial and Manpower Management Information System (REAL FAMMIS)	163	286	150	151	-	1,424

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	PMC						
C0935	Real-Time Financial and Manpower Management Information System			282	7,590	15,697	23,569
	OMA						
	Program Element 871813 AFEES Reporting System Project Project PDITR 003						
	Automatic Data Processing	245	250	1,678	2,558	-	4,731
	(AFEES Reporting System/Computerized Adaptive Testing) (Quantity)	-	TBD	TBD	TBD	TBD	TBD

Program Element:63731M
DoD Mission Area: 351-Land Warfare

Title: Marine Corps Command/Control/Communications Systems (Advanced)
Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Real-Time Financial and Manpower Management Information System will integrate manpower and pay information and record keeping requirements currently maintained in our present finance/manpower system, the Reserve Manpower Management and Pay System, the Retired Pay and Personnel File, service record books, performance evaluation, the Flight Readiness evaluation Data System individual training records and career planning records. It will be an on-line real-time information system designed to improve the operational capability at all command levels. It will incorporate the Marine Integrated Personnel System. The Marine Integrated Personnel System will use selective automation to support manpower and personnel functions in garrison, deployed and combat environments. It will utilize on-line real-time interactive automated data processing technology.

(U) RELATED ACTIVITIES: This program relates to all other Tactical Command and Control Systems.

(U) WORK PERFORMED BY: Potomac General Research Group, McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 AND Prior Accomplishments: Real-Time Financial and Manpower Management Information System: The requirements definition of the Automated Data System Development Process was conducted, identifying the deficiencies of the present Joint Uniform Military Pay System/Manpower Management System system (JUMPS/MMS). Requirements for a successor system were identified. The feasibility and telecommunications requirements studies of the Automated Data Systems Plan were also completed. Automated Data Processing Equipment for the Fleet Marine Force (ADPE-FMF): Designed the interface between Automatic Data Processing Equipment for the Fleet Marine Force and both the Management Information System (MIS) and the U-1500, standardized the Management Information System software to allow both uploading and downloading of files; initially tested both interfaces aboard ship.

2. (U) FY 1982 Program: Real-Time Financial and Manpower Management Information System: An economic analysis and the remainder of the Automated Data Systems Plan will be completed. Functional requirements will be delineated as part of the Functional Description of the Automated Data Systems Development Plan. Marine Integrated Personnel System: Complete prototype terminal development. Develop and test prompted input module.

3. (U) FY 1983 Planned Program: Real-Time Financial and Manpower Management Information System: Publish a Development Plan. Conduct a manpower analysis of the approved configuration, prepare a manpower impact statement, initiate Integrated Logistics Support Plan/Concept for each feasible system configuration and begin an analysis and design of automated data processing. Marine Integrated Personnel System: Begin analysis and design of automated data processing requirements. Deployed Automatic Data Processing Equipment-Systems Interface: Initiate Program.

Program Element:63731M
DoD Mission Area: 351 - Land Warfare

Title: Marine Corps Command/Control/Communications Systems (Advanced)
Budget Area: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Deployed Automatic Data Processing Equipment-System Interface: Program Initiation from FY 1983 continued.

5. (U) Program to Completion: Deployed Automatic Data Processing Equipment-System Interface: This is a continuing program from the FY 1983 initiation.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63737N
DoD Mission Area: 238 - Other Naval Warfare

Title: Link Hazel
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	42,760	9,870	Continuing	Continuing
R1679	Link Hazel	0	0	42,760	9,870	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Details of this program are of a higher classification and of limited access nature.

(U) BASIS FOR FY 1983 RDT&E REQUEST: As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through 1984 only.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Element: 63763N
ion Area: 323 - TIARA for Naval Warfare

Title: Integrated Tactical Surveillance System (ITSS)
Budget Activity: 4-Tactical Programs

SOURCES (PROJECT LISTING): (Dollars in Thousands)

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	[redacted]				TBD	TBD
Integrated Tactical Surveillance System					TBD	TBD

IEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element develops a system of systems including new and modified , processing and dissemination elements, and user modules in order to provide all weather, day/night surveillance of high t aircraft and ships in ocean areas and related littoral zones worldwide where U.S. naval forces may be employed in the of national objectives. The Integrated Tactical Surveillance System addresses the critical need for extended range lance data on high interest targets to support the Anti-Air and Anti-Surface elements of Naval Warfare.

IS FOR FY 1983 RDT&E REQUEST: Complete concept refinement and proceed with development of those subsystems approved to meet ments. Complete development of specifications for approved near-term enhancements which may include: (1) an afloat direct capability, (2) shore-based correlation and connectivity improvements, and (3) an over-the-horizon high frequency radar complete development of specifications for approved long-term subsystems; and begin engineering development on near-term and C^2 improvements. The above funding includes outyear escalation and encompasses all work or development phases now or anticipated through FY 1984 only.

OMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY Descriptive Summary and that shown in this Descriptive Summary are a decrease in FY 1982 of [redacted] as a result of the ment of Defense directed RDT&E reductions and Congressional action as reflected in the FY 1982 Appropriations Bill.

NDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT	[redacted]			TBD	TBD	TBD
Integrated Tactical Surveillance System				TBD	TBD	TBD

Program Element: 63763N
DOD Mission Area: 323 - TIARA for Naval Warfare

Title: Integrated Tactical Surveillance System (ITSS)
Budget Activity: 4-Tactical Programs

*Funds expended from Program Elements 63451N, 63530N, and 65858N for efforts appropriate to the Program Element Descriptions for those Program Elements.

(U) OTHER APPROPRIATIONS FUNDS: To be determined.

Program Element: 63763N
DOD Mission Area: 323 - TIARA for Naval Warfare

Title: Integrated Tactical Surveillance System (ITSS)
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Recent assessments of the threat and near-term projections of U.S. capabilities to the year 2000 conclude that the existing ocean surveillance system is inadequate to meet the offensive and defensive needs of tactical commanders. This element provides for the advanced development of a tactical surveillance system which integrates Navy, other service and national surveillance assets into a system capable of fulfilling surveillance requirements including detection, classification, and tracking in all types of environmental and electromagnetic emission control conditions.

(U) RELATED ACTIVITIES: This Program Element relates to systems for Navy Command, Control and Surveillance. Related programs are: Program Element 63717N, Project X0798, Over-the-Horizon Targeting and Project X0709, Navy Command/Control System Afloat; Program Element 64711N, Command and Control Systems; Program Element 31011N, Tactical Intelligence Systems; Program Element 62712N, Surface/Aerospace Target Surveillance; Program Element 33109N, Fleet Satellite Communications; Program Element 64777N, NAVSTAR Global Positioning System; Program Element 65858N, Command and Control Architecture and Management Support.

(U) WORK PERFORMED BY: In House: Project Manager is the Deputy Commander, Command, Control, Communications and Intelligence Systems and Technology Directorate, Naval Electronic Systems Command, Washington, DC. Primary Field Activities: Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; and Navy Space Systems Activity, Los Angeles, CA. Support Contractors: Johns Hopkins University, Applied Physics Laboratory, Silver Spring, MD. Industrial Contractors: Lockheed Missiles and Space Company, Sunnyvale, CA; Martin Marietta Corporation, Denver, CO; and McDonnell Douglas Astronautics Company, St. Louis, MO.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A Mission Element Needs Statement was approved by the Deputy Secretary of Defense on 8 January 1981. The Integrated Tactical Surveillance System was designated a major system. Contracts were awarded to Lockheed, Martin Marietta and McDonnell Douglas to formulate concepts to satisfy the mission need. The Air Force Space Division provided a portion of the funding for these contracts to integrate requirements for the Air Force atmospheric tactical warning mission into concept formulation efforts.

2. (U) FY 1982 Program: Completion of concept exploration which will lead to programmatic decisions at Defense Systems Acquisition Review Council I. These efforts include: an evaluation of the potential contribution of existing and anticipated sensors toward a wide area surveillance capability, definition of the optimum mix of sensor capabilities to provide timely and accurate wide area surveillance and targeting information to tactical commanders; and a measure of the technology risk, cost feasibility and time to develop potential system alternatives. After Milestone I, the program will proceed with system and sensor design refinement and with development of specifications for approved near-term enhancements which may include such subsystems as: Afloat Direct Readout Capability; Ashore Correlation and Connectivity Improvements; and an Over-the-Horizon Radar System.

Program Element: 63763N
DOD Mission Area: 323 - TIARA for Naval Warfare

Title: Integrated Tactical Surveillance System (ITSS)
Budget Activity: 4-Tactical Programs

3. (U) FY 1983 Planned Program: Specifications for all subsystems approved for development at Defense Systems Acquisition Review Council I will be completed and development will commence on near-term enhancements. The following efforts must be accomplished prior to Milestone II in late FY 1984: Complete development specifications, begun in FY 1982, for near-term enhancements including (1) an afloat direct readout and correlation capability, (2) shore-based correlation and connectivity improvements and an over-the-horizon radar system; complete development of specifications of sensor systems for an optimum solution; and begin engineering on the near-term sensor and command and control improvements.

4. (U) FY 1984 Planned Program: Continue to refine and define the system to support a Defense Systems Acquisition Review Council II (Milestone II) decision point in 1984.

5. (U) Program to Completion: Complete development and test of new sensors, modifications to existing command and control systems, and development of surveillance product user subsystems. Priority will be given to completing those subsystem elements which provide significant near-term improvements.

6. (U) Milestones:

Milestone		Date
1. Commence Concept Development	(October 1980)*	November 1980
2. Defense Systems Acquisition Review Council I	(January 1982)*	June 1982
3. Commence Validation/Advanced Development of Near-Term Enhancements	(January 1982)*	[redacted]
4. Defense Systems Acquisition Review Council II	(To be determined)*	Late 1984
5. Defense Systems Acquisition Review Council III		To be determined
6. Initial Operational Capability		To be determined
8. Full Scale Operational Capability		[redacted]

*Date from FY 1982 Program Element Descriptive Summary: Changes result from schedule and funding refinements.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63784N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Surveillance
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,149	1,235	1,284	4,280	TBD	Continuing
X0756	Lightweight Undersea Sensor Components	3,149*	1,235	1,284	1,414	TBD	Continuing
X1312	Fixed Distributed System	0	0	0	2,866	TBD	TBD

* Previously listed under Program Element 63794N, Anti-Submarine Warfare, in FY 1981 and prior.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the design and development of advanced undersea surveillance systems, and components for use therein, in order to provide tactical information to Anti-Submarine Warfare forces and assist in carrying out the Navy's ASW mission. The development of these systems is essential [ ] Future Sound Surveillance System capability will be enhanced by the development of lightweight, low-cost undersea sensor components [ ] These [ ] will form the basis for an integrated undersea surveillance system [ ]

(U) BASIS FOR FY 1983 RDT&E REQUEST: The funds for FY 1983 are required for continuation of the product improvements to Lightweight Undersea Sensor Components previously developed under Program Element 63794N. Lightweight Undersea Sensor Components are designed for utilization in future Fixed Distributed Surveillance systems to take advantage of the low cost, smaller components [ ] The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 63784N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Surveillance
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are the result of: A decrease of $2,071 in FY 1981 that was reprogrammed to PE 24313N (Surveillance Towed Array Sensor); refined cost estimates for Project X0756 (Lightweight Undersea Sensor Components) in FY 1981 through FY 1984; inflation reduction of -41 in FY 1982 and -40 in FY 1983; and, the addition of $2,866 for the restart of Project X1312 (Fixed Distributed System) in FY 1984 utilizing the new and less expensive lightweight components.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,564*	5,220	1,276	1,324	81,796**	Continuing
X0756	Lightweight Undersea Sensor Components	5,564*	5,220	1,276	1,324	6,445**	49,284**
X1312	Fixed Distributed System	0	0	0	0	75,351**	75,351**

* Previously listed under Program Element 63794N, Anti-submarine Warfare, in FY 1981 and prior.
** Cost through FY 1987

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN Funds (PE 24311N) Quantity (Various Components)	16,520	20,570	22,130	18,970	33,980*	161,070*

* Cost through FY 1986 only.

Program Element: 63784N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Surveillance
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The program was initiated in FY 1967 when the Sound Surveillance System was the only undersea surveillance system. The Sound Surveillance System] and connected by cable to data processing, display and analysis facilities ashore. The operational objective of the Sound Surveillance System is the detection, classification and localization of threat submarines in all operational modes under all environmental conditions. However, / necessitate surveillance improvements / as well as improved fixed systems. Advanced surveillance system development is essential] and the Sound Surveillance System] To achieve an optimum Integrated Undersea Surveillance System, Navy studies have identified requirements for both improved Sound Surveillance System-type] to operate in areas where the Sound Surveillance System cannot be installed or becomes inoperative, or where surveillance augmentation is required. The only wet-end improvement project now under development in this program is the Lightweight Undersea Sensor Components. This program element provides for the development of improvements to the low-cost components previously / 7 These new lightweight components] also provide the unique low-cost, lightweight components which are required for future fixed systems such as the Fixed Distributed System.

(U) RELATED ACTIVITIES: Program Element 24311N, Undersea Surveillance Systems, provides for the development of data processing technology which will be applicable to the systems under development in this program and for the integration of these systems with the Sound Surveillance System. Other related programs are: Program Element 63788N, Rapidly Deployable Surveillance System, and Program Element 24313N, Surveillance Towed Array Sensor.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Research Laboratory, Washington, DC; Naval Civil Engineering Laboratory, Port Hueneme, CA. Contractors: General Electric Company, Syracuse, NY; TRW Systems, McLean, VA; Bell Telephone Laboratories, Whippany, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Under Program Element 63794N, Anti-Submarine Warfare Surveillance (moved to Program Element 63784N in FY 1982), Fixed Distributed System concept formulation studies were completed, sensor configuration was defined, prototype terminal and transmission units were procured, and technology assessment was initiated. Fixed Distributed System technology assessment was completed and project emphasis was redirected to component vice system development with the initiation of Lightweight Undersea Sensor Components with technology development continued on the preliminary design. Final model design and development was completed in FY 1981. Fixed Distributed System development utilizing these components will recommence [ ] to ensure that the submarine threat of the 80's remains within the capabilities of the Sound Surveillance System.

Program Element: 63784N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Anti-Submarine Warfare Surveillance
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Initiate product improvements in preparation for system-wide use.

3. (U) FY 1983 Planned Program: Continue product improvements.

4. (U) FY 1984 Planned Program: Continue product improvements and reinitiate Fixed Distributed System development.

5. (U) Program to Completion: Continue Fixed Distributed System development and development of applications of these more cost effective and flexible lightweight components into the overall Fixed Surveillance System. Complete system development and at-sea testing [ ] as approved to ensure Lightweight Undersea Sensor Components maintain the ability to provide current data on Soviet submarine movements.

6. (U) Milestones:

Milestone	Date
a. Complete lightweight product improvement	(September 1982)* Continuing effort
b. Resume Fixed Distributed System development	October 1983
c. Initiate Fixed Distributed System Operational Test and Evaluation	(October 1986)* August 1988
d. Initiate Fixed Distributed System Developmental Test and Evaluation	June 1986

*Date shown in FY 1982 Descriptive Summary. Change in date is due to decision to slip the program two years.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63785N
Title: Long Range Acoustic Propagation
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	*10,340	10,814	12,578	16,898	Continuing	Continuing
R0119	Surveillance Environmental Acoustic Support	7,842	7,485	8,991	12,220	Continuing	Continuing
R0120	Tactical Anti-Submarine Warfare Environmental Acoustic Support	2,498	3,329	3,587	4,678	Continuing	Continuing

* Shown in Program Element 63795N, Long Range Acoustic Propagation, in FY 1981 and prior years. Program Element number administratively changed to 63785N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provide environmental information essential to optimize the design, development and performance of undersea acoustic surveillance and tactical anti-submarine warfare systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue a multi-year program to support anti-submarine warfare systems. Based on environmental conditions, assess potential surveillance system options and capabilities in selected areas. Continue Programs will also be continued. The funding increase from FY 1982 to FY 1983 supports planning and equipment preparation As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflect a reordering of program priorities, directed budget cuts and cancellation of the program. R0119: FY 1981 increase of $508 was due to an increase in scope of the program FY 1982 decrease of $3156 is due to a $2968 program funding cut and a $138 decrease for reduction in scope FY 1983 decrease of $2754 is due to a program funding cut and the reduced scope

Program Element: 63785N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Long Range Acoustic Propagation
Budget Activity: 4 - Tactical Programs

R0120: FY 1981 decrease of $42 is a result of reprogramming. FY 1982 decrease of $454 is due to a $385 program funding cut and a $69 decrease due to cancellation of the FY 1983 decrease of $1046 is due to a program funding cut and reduced scope due to cancellation.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	*13,545	*9,874	14,424	16,378	Continuing	Continuing
R0119	Surveillance Environmental Acoustic Support	10,975	7,334	10,641	11,745	Continuing	Continuing
R0120	Tactical Anti-Submarine Warfare Environmental Acoustic Support	2,570	2,540	3,783	4,633	Continuing	Continuing

*Shown in Program Element 63795N, Long Range Acoustic Propagation in FY 1981 and prior years. Program Element number administratively changed to 63785N.

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 63785N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Long Range Acoustic Propagation
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Long Range Acoustic Propagation Project was established in 1966 to provide support for Anti-Submarine Warfare systems. The program was expanded in 1978 to include similar support for systems. Support is provided. These furnish a basis for system deployment decisions. The Surveillance Environmental Acoustic Support project (R0119) stresses support of acoustic surveillance systems. Tactical (non-surveillance) environmental acoustic support, is funded under Project R0120, Tactical Anti-Submarine Warfare Environmental Acoustic Support.

(U) RELATED ACTIVITIES: This project provides direct ocean environmental acoustic support for research and development pursued under the following Program Elements: 24311N, Undersea Surveillance System; 63788N, Rapidly Deployable Surveillance Systems; 64789N, Surveillance Towed Array Sensor; 63784N, Anti-Submarine Warfare Surveillance; 63259N, Acoustic Search Sensors (Advanced); 63553N, Surface Anti-Submarine Warfare; 63708N, Anti-Submarine Warfare Signal Processing; 64713N, Tactical Towed Array Sonars; 63601N, Mine Development; and 64503N, Submarine Sonar Development.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Ocean Research and Development Activity, Bay St. Louis, MS; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT. Contract: Analysis & Technology, Inc., North Stonington, CT; B-K Dynamics, Inc., Rockville, MD; Ocean Data Systems, Inc., Rockville, MD; Planning Systems, Inc., McLean, VA; Science Applications, Inc., McLean, VA; Tracor, Inc., Rockville, MD; University of Texas (Applied Research Laboratory), Austin, TX; University of Washington (Applied Physics Laboratory), Seattle, WA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Ocean acoustic measurements of sound propagation and ambient noise were conducted to ass environmental acoustic limitations. Operation WESTLANT 80 was successfully completed in FY 1981. Oceanographic, acoustic propagation, and ambient noise data banks were structured and implemented. developed, evaluated and used as inputs to force level studies, and for system design and development. Mid-water systems were developed and measurements made. The Automated Signal Excess Prediction System is operational at Fleet Numerical Oceanography Center, and an on-site version is being developed. System model is operational. A more efficient, updated version of the Ship-Helicopter Acoustic Range Prediction System III is in use at the Fleet Numerical Oceanography Center for providing forecasts of acoustic conditions to anti-submarine warfare

forces. An improved acoustic bottom loss model has been developed to replace crude estimates of bottom loss previously used. A shore based acoustic prediction model to support the operational deployment of the buoy was developed. Improved mid-water acoustic measurement systems have been completed and tested. Environmental acoustic support was provided to a variety of tactical anti-submarine warfare systems under development, A long term anti-submarine warfare acoustic program was initiated.

2. (U) FY 1982 Program: Continuation of surveillance alternatives assessment is planned. Environmental acoustic measurements will be initiated System array characterization program will be initiated Environmental acoustic models will be synthesized and adapted to accommodate tactical system characteristics. Fleet support modeling efforts will continue. Delivery and testing of environmental data sets for the program will be completed.

3. (U) FY 1983 Planned Program: Development of new mid-water acoustic measurement systems will be completed. Data obtained in previous measurement exercises will be analyzed and reported. Plans for measurement exercise will be formulated in conjunction with the Naval Oceanographic Office. Fleet support modeling will continue.

4. (U) FY 1984 Planned Program: A major measurement program in support of options will be conducted in conjunction with the Naval Oceanographic Office. Fleet environmental acoustic modeling support for performance prediction will continue. Analysis of environmental acoustic information to support and improve system opertional capability will continue.

5. (U) Program to Completion: Long Range Acoustic Propagation is a continuing project Program scope and emphasis is governed by anticipated advances and by imposed Anti-Submarine Warfare system program requirements. Subsequent measurement efforts will continue to assess system performance and validate new techniques.

6. (U) Milestones: Not applicable.

Project: R0119 Title: Surveillance Environmental Acoustic Support
Program Element: 63785N Title: Long Range Acoustic Propagation
DOD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Surveillance Environmental Acoustic Support Project was formalized in 1973 by Program Memorandum 60. Navy Decision Coordinating Paper No. R-0119 was approved in 1979. The project objective is support of design, deployment and operation of Anti-Submarine Warfare Surveillance Systems. The project emphasizes development of an acoustic prediction capability through the use of computerized acoustic models verified by measured data. Comprehensive ambient noise and signal propagation models have been developed and tailored to accept as inputs the specific characteristics of selected surveillance systems. Major data acquisition exercises have been conducted both to evaluate models and to provide definition of environmental acoustic characteristics in high priority ocean areas. Measurement systems to support the data acquisition objectives are developed and maintained as part of the project. The project effort is structured functionally into four areas: (a) Model Development synthesizes potentially useful models, usually initiated in the research or exploratory development communities, for performance prediction. Candidate models are evaluated against acoustic data (transmission loss, ambient noise, etc.) taken under carefully controlled conditions. The evaluation process yields reliable models for fleet acoustic predictions, research and development of Anti-Submarine Warfare systems, and systems trade-off analyses for Navy management. (b) Measurement and analysis efforts are devoted to obtaining high quality acoustic and environmental data during controlled sea exercises for use in evaluation of undersea surveillance and Anti-Submarine Warfare systems and operations. (c) Measurement Systems work supports measurements and analysis efforts by providing the specialized instrumentation and techniques required to obtain the needed high quality acoustic and environmental data. (d) General Support pays for staff salaries, travel, consumables (such as explosive source charges, sonobuoys and minor equipment items), data handling facilities and technical assistance from laboratories and contractors.

(U) RELATED ACTIVITIES: This project provides direct ocean acoustic requirements support for research and development pursued under the following Program Elements: 24311N, Undersea Surveillance System; 63788N, Rapidly Deployable Surveillance Systems; 64789N, Surveillance Towed Array Sensor; 63784N, Anti-Submarine Warfare Surveillance; 63259N, Acoustic Search Sensors (Advanced); and 63553N, Surface Anti-Submarine Warfare.

(U) WORK PERFORMED BY: In-House: Naval Ocean Research and Development Activity, Bay St. Louis, MS; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT. Contract: Arthur D. Little, Inc., Cambridge, MA; B-K Dynamics, Inc., Rockville, MD; Ocean Data Systems, Inc., Rockville, MD; Planning Systems, Inc., McLean, VA; Science Applications, Inc., McLean, VA; Tracor, Inc., Rockville, MD; University of Texas (Applied Research Laboratory), Austin, TX; Woods Hole Oceanographic Institute, Woods Hole, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Ocean acoustic measurements of sound propagation and ambient noise were made to define system performance [redacted]

Project: R0119
Program Element: 63785N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Surveillance Environmental Acoustic Support
Title: Long Range Acoustic Propagation
Budget Activity: 4 - Tactical Programs

Oceanographic, acoustic propagation, and ambient noise data banks were structured and implemented. Environmental acoustic models were developed, validated, and used as inputs to force level studies, and for system design and development. Mid-water measurements were made using specially designed instruments. Signal coherence data were also gathered and ambient noise horizontal directionality was analyzed. A int exercise, was completed and the resulting data are being used for assessment of surveillance system options. Operation BIG DIPPER demonstrated successful deployment The Automated Signal Excess Prediction System performance model has been implemented. An on-site version has been developed for fleet centers. The System has been successfully tested at sea. A mid-water system was developed during acoustic validation tests. Towed array performance was assessed. Vertical array capabilities were investigated using the Floating Instrumentation Platform.

2. (U) FY 1982 Program: Continuation of surveillance alternatives assessment are planned. Environmental acoustic measurements will be made Development, testing and implementation of performance models will be continued.

3. (U) FY 1983 Planned Program: Development of new mid-water systems will be completed. Data obtained in previous measurement exercises will be analyzed and reported. Joint plans for a measurement exercise will be formulated in conjunction with the Naval Oceanographic Office. program will continue. System Performance model development will continue.

4. (U) FY 1984 Planned Program: A major measurement program will be conducted jointly with the Naval Oceanographic Office. Fleet environmental acoustic modelling support for performance prediction will continue. Analysis of environmental acoustic information and data to support and improve acoustic systems operational capability will continue.

5. (U) Program to Completion: Surveillance Environmental Acoustic Support is a continuing project to provide needed for Anti-Submarine Warfare! Program scope and emphasis is governed by anticipated advances and by imposed Anti-Submarine Warfare system program requirements. Measurement efforts will continue to assess system performance and validate new techniques.

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DEPARTMENT OF THE NAVY SUPPORTING DATA FOR FISCAL YEAR 1983 BUD--ETC(U)
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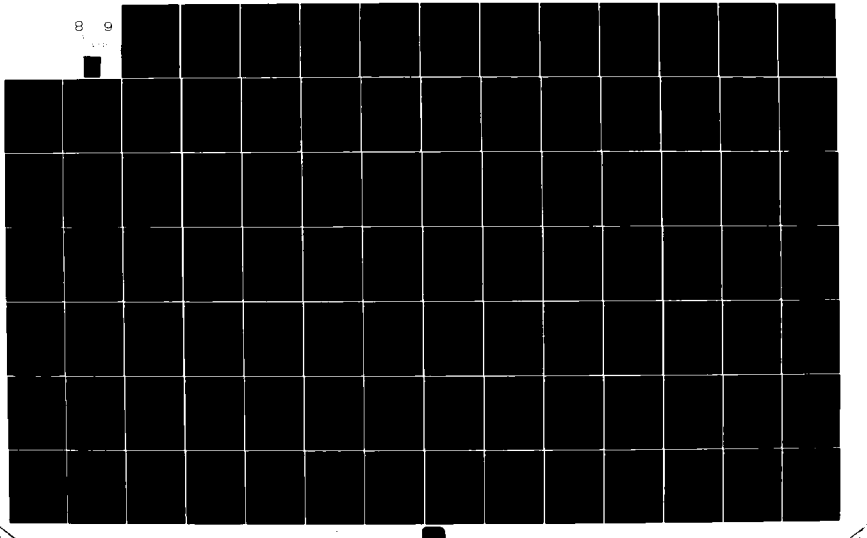

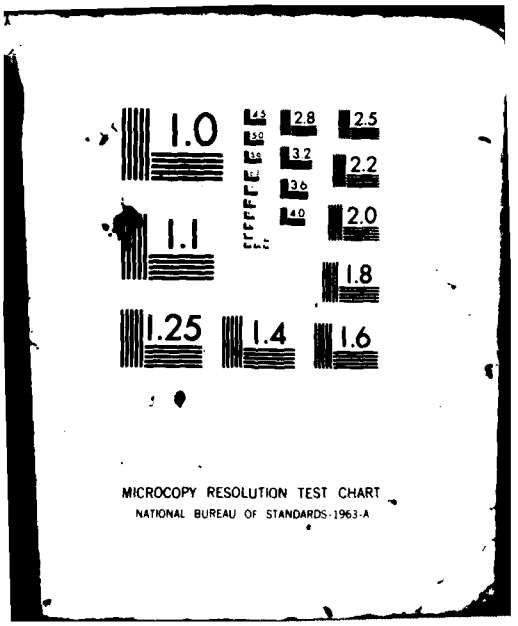
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Project: R0119
Program Element: 63785N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Surveillance Environmental Acoustic Support
Title: Long Range Acoustic Propagation
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0119	Surveillance Environmental Acoustic Support	7,842	7,485	8,991	12,220	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63787N
Title: Special Processes
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	26,041*	46,337	72,523	68,923	Continuing	Continuing
T0116	Linear Tank	26,041*	46,337	72,523	68,923	Continuing	Continuing

* Funded in Program Element 63798N

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Details of this program are of a higher classification and of limited access nature.

(U) BASIS FOR FY 1983 RDT&E REQUEST: As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63788N
Title: Deployable Surveillance Systems
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	13,348	6,763	19,312	21,646	60,499	137,679
X0955	Rapidly Deployable Surveillance System (RDSS)	13,348	6,763	19,312	21,646	60,499	137,679
	Quantity		(D/OT&E)	(D/OT&E)	(D/OT&E)	(D/OT&E)	(350)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the development of [ ] long-life, moored surveillance system of passive sensors to detect [ ] submarines. As a flexible element of the Integrated Undersea Surveillance System, the Rapidly Deployable Surveillance System provides quick-reaction submarine surveillance [ ] because of political, economic or other operational considerations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funds requested are to continue full scale development of Rapidly Deployable Surveillance System. The increase in FY 1983 over FY 1982 is due to the major engineering development efforts leading to the fabrication of engineering development models for subsequent engineering and technical evaluation. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1988 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary (-$4,237 in FY 1982 and amounts now reflected in FY 1983 and out) result from a $4,000 Congressional reduction in FY 1982 and from the fact that the program has since been restructured due to the completion of the Advanced Development phase and the decision in May 1981 to enter full scale development.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,170	13,348	11,000	TBD	TBD	
X0955	Rapidly Deployable Surveillance System	5,170	13,348	11,000	TBD	TBD	

Program Element: 63788N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Deployable Surveillance Systems
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN Funds					125,944	125,944
Quantity						

Program Element: 63788N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Deployable Surveillance Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Surveillance of all submarines which might pose a threat to the US, its sea lines of communications, and its operating forces is an essential element of maritime superiority which is the foundation of national security.

The present system network of undersea sensors consists of

However, new submarine threat characteristics and tactics are continually evolving and dictate the development of surveillance flexibility in the form of mobile and deployable systems. National Academy of Sciences and private industry studies have identified deployable surveillance systems as a cost-effective means

Studies were performed which established a Moored Surveillance System as a cost effective means

Three contractors completed competitive concept formulation studies and follow-on concept validation contracts were awarded to General Electric and Sanders Associates with emphasis on buoy development. Contractor efforts initially involved buoy performance specifications development, design, fabrication and mechanical and acoustical tests. Mechanical buoy design was demonstrated by twenty-three bouys, fourteen of which had hydrophones installed for simultaneous acoustic performance evaluation. Field processing evaluations were performed using available shore station simulators. Mooring, launching and other technologies resulting from underwater weapon development programs were investigated to determine their suitability and applicability to Moored Surveillance System. Modified off-the-shelf acoustic buoys were procured to conduct a field validation test at sea. Data derived from this test provided the basis for data compaction, use of existing communications channels, system size and cost reduction potentials, and impact of micro-electronics on the system. A Test and Evaluation Master Plan was developed, and a detailed Moored Surveillance System cost analysis using analytical models was performed. Conceptual studies were completed by General Electric and Sanders Associates for development of a lower cost, smaller size, and lighter weight system. The moored surveillance system program was terminated in FY 1978, and the Rapidly Deployable Surveillance System was established in 1979. The Rapidly Deployable Surveillance System concept (Mod 0) consists of moored, near-bottom sensor system which is to relay acoustic data on command to either maritime patrol or sea-based ASW aircraft for real-time threat analysis and evaluation purposes.

Data can then be analyzed on board or transported to an Anti-Submarine Warfare Operations Center (ASWOC) for post flight processing and analysis. Data is then transmitted to a main evaluation center

A growth option (Mod 1) is under study

A decision whether to pursue this option is scheduled

Sensors are to be deployable in water depths

Program Element: 63788N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Deployable Surveillance Systems
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: Program Element 63785N, Long Range Acoustic Propagation, will conduct environmental measurements, perform data analyses, and provide effectiveness studies. Other related research and development programs/projects are: Program Element 24313N, Surveillance Towed Array Sensor, Project SEAGUARD, and Program Element 24311N Undersea Surveillance System.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA. Contractors: Sanders Associates, Inc., Nashua, NH; TRW Systems, McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Rapidly Deployable Surveillance System program was initiated in FY 1979, based on advanced development efforts conducted under the Moored Surveillance System program, taking advantage of technical advances to reduce size, weight, and cost. Based on their experience in the Moored Surveillance system program, Sanders Associates through competition was selected for the Rapidly Deployable Surveillance System program demonstration/validation phase of advanced development. The following test and evaluation and studies have been accomplished: design, fabrication and testing of the Rapidly Deployable Surveillance System; trade-off studies of cost versus performance; demonstration of data relay for remote shore processing application; i.e. validation of the acoustic characteristics and certification of sensor air deployment considerations and demonstration of the Rapidly Deployable Surveillance System designed components; demonstrating that sensor electronics are capable of extracting pre-selected data outputs for processing and/or storage. Completed demonstration and validation testing including design considerations for sensor placement. Mod 0 full scale development approval was granted by the Secretary of the Navy in May 1981, as a result of the March 1981 Department of the Navy System Acquisition Review Council Milestone II. The Mod 0 full scale development contract was awarded in August 1981 to Sanders Associates.

2. (U) FY 1982 Program: Mod 0 design and subsystem testing will continue. A directed exploratory development effort will be initiated by the Chief of Naval Development in support of the Mod 1.

3. (U) FY 1983 Planned Program: Mod 0 full system testing will continue. Mod 1 studies will be completed.

4. (U) FY 1984 Planned Program:

Program Element: 63788N
DOD Mission Area: 233 - Anti-Submarine Warfare

Title: Deployable Surveillance Systems
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Mod 0 Technical Evaluation/Operational Evaluation will be completed. Approval for service use and production approval following a Department of the Navy Acquisition Review Council Milestone III will be sought. If approved, Mod 1 full scale development will proceed, leading to an [redacted] Department of the Navy Acquisition Review Council Milestone III.

6. (U) Milestones:

Milestone:		Date
a. Completed Advanced Development Model Fabrication and Test		May 1980
b. Completed Demonstration/Validation Phase		September 1980
c. Department of Navy System Acquisition Review Milestone II		March 1981
d. Completed Advanced Development; Received Full Scale Development Approval	(September 1981)*	May 1981
e. Final Design Review; Initiate subsystem testing		
f. Complete Full System Testing		
g. Commence Technical Evaluation		
h. Commence Operational Evaluation		
i. Complete Operational Evaluation		

* Date shown in the FY 1982 Descriptive Summary

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64203N
Title: Avionics Development
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,881	12,501	8,960	3,022	Continuing	Continuing
W0572	Avionics Components and Subsystems	1,218	1,205	1,531	1,367	Continuing	Continuing
W0845	AN/AYK-14(V)	6,353	11,296	7,429	1,655	Continuing	Continuing
W1276	Electromagnetic Compatibility Aerospace Research and Development	1,310	-	-	-	-	1,310

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Currently included in this element are two projects as follows:

W0572 Avionics Components and Subsystems provides for the design, development, evaluation and qualification of a family of less than major standard avionics equipment that meets multi-mission needs and can be utilized by a wide range of aircraft platforms. Avionics Components and Subsystems also provides for interservice coordination on joint avionic standardization. Major standard avionics will be addressed under separate program elements/projects descriptive summaries. The Avionics Components and Subsystems project is in consonance with the Naval Aviation Plan goals, providing the means to (1) ensure the logical and efficient transfer of exploratory and advanced development technology into engineering development, (2) reduce the fleet maintenance and logistic burden through maximum use of commonality, better hardware design, and usable technical information; and (3) take advantage of the full set of technical opportunities available in the existent and projected technology base to develop affordable systems which serve to maximize the capabilities of aviation at sea.

W0845 AN/AYK-14(V) provides for the development and production of a Navy Standard Airborne Computer capable of satisfying 90 - 95% of the digital computer requirements in the 1977-1990 time frame. In the decade prior to the introduction of the AN/AYK-14(V), each weapon system developed its own computer as contractor furnished equipment. As a result, the proliferation of functionally similar but logistically unique hardware, software and documentation had begun to reach epidemic proportions. The AN/AYK-14(V) project is an outgrowth of the requirement to reduce the proliferation of unique computer systems by developing a standard design flexible enough to permit its use in a wide variety of applications for which total hardware and support software can be standard Government Furnished Equipment resulting in greatly reduced life cycle costs.

Program Element: 64203N
DoD Mission Area: 238 - Other Naval Warfare

Title: Avionics Development
Budget Activity: 4 - Tactical Programs

(U) BASIS FOR FY 1983 RDT&E REQUEST:

W0572 Avionics Components and Subsystems: During FY 1983, this project will continue to provide interservice coordination and review of joint avionics projects. During FY 1981 the Navy and Air Force had coordinated and begun the engineering development of the Standard Central Air Data Computer. FY 1983 will complete the technical and operational evaluation tests for the Central Air Data Computer. Coordination with the Army and Air Force on a Standard Intercommunications System will continue. A Naval Avionics Master Plan will be prepared and forwarded to the Chief of Naval Operations for review and approval.

W0845 AN/AYK-14(V): The following schedule of events is planned for the AN/AYK-14(V) project during FY 1983: (1) complete Retrofit-to-Baseline of preproduction computers, (2) continue contractor interim support until Navy Support Date (October 1984), (3) continue development of a Second Course using the Leader/Follower Procurement approach, (4) continue development of integrated operational logistic support elements and, (5) continue development, testing and qualification of additional standard modules to support new users as required.

As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are: W0572, Avionics Components and Subsystems: -13 in FY 1981 due to cost refinements, -31 in FY 1982 due to reprogramming; and +265 in FY 1983 due to starting new programs within Avionic Components and Subsystems. W0845, AN/AYK-14(V): +1,836 in FY 1981 is for product improvement, -395 in FY 1982 is due to overall budget reductions and -332 funding in FY 1983 is a result of Navy budget reductions. W1276, Electromagnetic Compatibility Aerospace Research and Development: -10 in FY 1981, -2,362 in FY 1982 and -2,801 in FY 198[illegible] as this project is not funded. It was deleted through a Navy budget decision.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,572	7,068	15,289	11,828	Continuing	Continuing
W0572	Avionics Components and Subsystems	0	1,231	1,236	1,266	Continuing	Continuing
W0845	AN/AYK-14(V)	4,572	4,517	11,691	7,761	Continuing	Continuing
W1276	Electromagnetic Compatibility Aerospace Research and Development	-	1,320	2,362	2,801	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: 64203N
DoD Mission Area: 238 - Other Naval Warfare

Title: Avionics Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION:

WO572 Avionics Components and Subsystems: A growing concern among the military avionics community is the proliferation of unique avionic equipments that increases with each new or modified aircraft project. This proliferation of unique Contractor Furnished Equipment due to nonavailability of off-the-shelf Government Furnished Equipment is resulting in a growing cost burden in the areas of development, procurement, logistics, maintenance and other factors related to system life cycle cost. To meet this threat, the Avionics Components and Subsystems program has been formulated to provide for the orderly development of a family of Government Furnished Equipment, supportive of, but separate from, major aircraft weapon system acquisitions and common to multiple aircraft types. This objective is in consonance with Government Accounting Office letter report B-163058 of 12 May 1978. The approach taken to meet the objectives will be to develop and use flexible and adaptable design concepts to ensure multiple aircraft commonality, as well as triservice interoperability. This program will be of a continuing nature with new development efforts continually being identified and undertaken. An Avionics Components and Subsystems Joint Services Review Board has been formulated to review commencement of joint engineering developments whenever practical and feasible.

WO845 AN/AYK-14(V): The AN/AYK-14(V) is a general purpose, standard airborne computer designed to satisfy the majority of airborne digital processing requirements in the 1977 - 1990 time frame. As such, the AN/AYK-14(V) provides an alternative to the proliferation of functionally similar but logistically unique computer systems developed for each new weapon system or system update. Other major objectives of the project are to reduce operations and support costs through standardization while providing flexibility and growth potential, high reliability, easy maintainability, low initial acquisition cost, and state-of-the-art performance with a low RDT&E investment. While the AN/AYK-14(V) is designed specifically for operation in airborne environments, the basic computer design is also compatible with shipboard and land based applications. Off-the-shelf microelectronic technology is used to implement a building block approach to configuring a family of computer systems tailored to each application without hardware/firmware redesign. The AN/AYK-14(V) utilizes a modular design functionally partitioned into pluggable Shop Replaceable Assemblies. All functions such as logic, register memory and internal communications have been implemented using off-the-shelf large scale integrated semi-conductor technology. The computer system is designed for flexibility to enable construction of different system configurations without redesign or modifications to any of the following subsystems: (1) Processor Subsystem, (2) Input/Output Subsystem, (3) Memory Subsystem, (4) Power Supply Subsystem, and (5) Chassis Subsystem. The AN/AYK-14(V) uses the Machine Transferrable AN/UYK-20 AN/AYK-14(V) Support Software developed for the AN/UYK-20, and implements an instruction set that is compatible with the AN/UYK-20. The AN/UYK-20 is the standard mini-computer for Navy shipboard use. The following AN/AYK-14(V) applications have been identified: F/A-18, LAMPS MK III, EP-3B/E, FIREBRAND, AV-8B, EA-6B, E-2C, P-3C, Stand-Off Target Acquisition System, Advanced Lightweight Torpedo, Integrated Signal Intelligence System, Automatic Carrier Landing System, Advanced Aircraft Electrical System and Advanced Aircraft Armament System. The project is of a continuing program nature tc permit technology infusion which will extend the life of the AN/AYK-14(V) as a viable standard computer.

Program Element: 64203N
DoD Mission Area: 238 - Other Naval Warfare

Title: Avionics Development
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES:

W0572 Avionics Components and Subsystems: A tri-service Memorandum of Agreement to promote joint development of standard avionics components and subsystems has been signed. Each service will identify and emphasize program elements that promote interservice standardization activities, of which this project is one. Currently, a joint USAF/USN Standard Central Air Data Computer has been formulated and a USN/USA/USAF Standard Intercommunication System is being coordinated. The Navy's Advanced Engineering Project, Modular Avionics Packaging, P.E. 63217N, Project W0885, is investigating new technology packaging concepts for future applications in, interalia, the Avionics Components and Subsystems Project.

W0845 AN/AYK-14(V): This effort is coordinated with the AN/UYK-20(V) Project Office to assure software compatibility between the AN/AYK-14(V) and the AN/UYK-20(V) computer systems.

(U) WORK PERFORMED BY: In-House:

W0572 Avionics Components and Subsystems: Naval Avionics Center, Indianapolis, IN (lead laboratory); Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, D.C.; Naval Ship Engineering Center, Norfolk, VA; Naval Air Test Center, Patuxent River, MD.

W0845 AN/AYK-14(V): Naval Avionics Center, Indianapolis, IN (lead laboratory); Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Electronic Systems Command, Washington, D.C.

Contractors:

W0572 Avionics Components and Subsystems: Airesearch Co., Torrance, CA; Marconi Avionics Ltd., Rochester, Kent, England.

W0845 AN/AYK-14(V): Control Data Corporation, Minneapolis, MN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments

W0572 Avionics Components and Subsystems: New start in FY 1979. Basic Outline for the Navy Avionics Master Plan was completed. A Navy guidance document for the use of the MIL-STD-1553B data bus was drafted and final review initiated. Acquisition strategies for common avionics developments were identified. The Avionics Components and Subsystems Program objectives, requirements and guidelines summary was completed. An Avionics Components and Subsystems Selection Board, under the Program Manager for Avionics,

was formulated to review, select and prioritize common avionics projects for engineering development. FY 1980 was not funded by Congress. During FY 1980 the Navy coordinated with the other services, as directed by Congress, to eliminate duplication of efforts. A Joint Memorandum of Agreement was coordinated to promote interservice avionics components and subsystems development. An interservice USN/USAF cooperative effort for the joint engineering development of a Standard Central Air Data Computer was contracted in FY 1981.

W0845 AN/AYK-14(V): The program was initiated in April 1976 with a competitive source selection. The resultant development contract awarded to Control Data Corporation in September 1976 is Cost Plus Incentive Fee for design, development, test, delivery of test units and preproduction units, data, and contractor support. The initial "Brassboard" computer delivery to the Navy for use by the F/A-18 Project occurred in May 1977. Delivery of preproduction units for support of user RDT&E requirements began in October 1977. Contractor design approval tests (environmental tests) were successfully completed in December 1977. The Navy Technical Evaluation (DT-IIA) and Operational Test and Evaluation (OT-IIA) flight testing was successfully completed. Commander Operational Test and Evaluation Force recommended continued development and continued united production to support user system development. Contractor Reliability Development Tests (10,500 hours mission profile Test, Analyze and Fix) were completed in September 1979 and a baseline design freeze achieved. The maintainability demonstration has been successfully completed. Retrofit of pre-production computers to baseline configuration has been initiated. Implementation of second source program Leader/Follower Procurement approach has been initiated. Development and testing of additional standard modules and computer configurations for new users continues. Interim logistics support continues as integrated operational logistics support planning and development matures.

2. (U) FY 1982 Program:

W0572 Avionics Components and Subsystems: The Joint Central Air Data Computer Project will commence the design, development, laboratory reliability testing and qualification testing. The specification and program requirements for a Standard Intercommunications System, interalia, will continue to be coordinated with the Army and Air Force for joint development beginning in FY 1984. Coordination with the Air Force and Army on standard avionic projects is on a continuing basis. The Navy Avionics Master Plan has been completed and submitted to the Chief of Naval Operations.

W0845 AN/AYK-14(V): Complete delivery of preproduction units for use by user projects. Continue interim contractor support. Complete Preproduction Tests. Continue Retrofit-to-Baseline for preproduction hardware. Continue development of Second Source using the Leader/Follower Procurement approach. Develop, test and qualify standard components for new user applications. Formulate candidate development proposals for infusion of new technology into AN/UYK-14(V) forward fit and/or retrofit. Continue development of integrated logistic support elements. Continue development of preliminary technical publications (intermediate level-of-maintenance).

lement: 64203N
on Area: 238 - Other Naval Warfare

Title: Avionics Development
Budget Activity: 4 - Tactical Programs

FY 1983 Planned Program:

onics Components and Subsystems: Continue coordination with the Army and Air Force on cooperative standard avionics Complete laboratory reliability and qualification tests, technical evaluation and operational evaluation testing of the Central Air Data Computer. The Naval Avionics Master Plan will be updated as required. New hardware developments will be . New start hardware developments will be identified for commencement in FY 1984.

AYK-14(V): Induction of preproduction computers to the Retrofit-to-Baseline program will be completed. Continue interim r support. Continue implementation of second source production via the Leader/Follower Procurement approach. Develop, qualify standard components for new user applications. Initiate development of selected new technology infusion projects ard fit and/or retrofit. Continue development of intermediate level of maintenance technical publications and begin nt of depot level of maintenance technical publications. Continue provisioning to meet material support date in third Y 1984. Initiate development of selected new technology infusion projects for forward fit and/or retrofit. First fleet of intermediate level test set (Memory Loader/Verifier) and Category IIID automatic test equipment will occur. Complete gnetic Compatibility system tests.

FY 1984 Planned Program:

onics Components and Subsystems: Continue coordination with the Army and Air Force on cooperative standard avionic The Standard Central Air Data Computer will be released to full scale production. Initiate new start standard avionic interalia, the standard Intercommunication set or the standard flight crash recorder or the standard extremely high data link of the standard altitude needing reference system. New start hardware will be identified for commencement in The Naval Avionics Master Plan will be updated as required.

AYK-14(V): Continue implementation of logistics elements until material support date in third quarter FY 1984. ate and depot level maintenance technical publications will be completed. Complete deliveries of retrofitted computers. implementation of Second Source development by the Leader/Follower Procurement approach. Continue development, testing ification of additional standard components for new user applications. Continue contractor interim support until Navy ate in first quarter FY 1985.

Program to Completion: This is a continuing program.

Milestones: Not applicable.

Project: W0845 Title: AN/AYK-14(V)
Program Element: 64203N Title: Avionics Development
DoD Mission Area: 238 - Other Naval Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The AN/AYK-14(V) is a general purpose, standard airborne computer designed to satisfy the majority of airborne digital processing requirements in the 1977 - 1990 time frame. As such, the AN/AYK-14(V) provides an alternative to the proliferation of functionally similar but logistically unique computer systems developed for each new weapon system or system update. Other major objectives of the project are to reduce operations and support costs through standardization while providing flexibility and growth potential, high reliability, easy maintainability, low initial acquisition cost, and state-of-the-art performance with a low RDT&E investment. While the AN/AYK-14(V) is designed specifically for operation in airborne environments, the basic computer design is also compatible with shipboard and land based applications. Off-the-shelf microelectronic technology is used to implement a building block approach to configuring a family of computer systems tailored to each application without hardware/firmware redesign. The AN/AYK-14(V) utilizes a modular design functionally partitioned into pluggable Shop Replaceable Assemblies. All functions such as logic, register memory and internal communications have been implemented using off-the-shelf large scale integrated semi-conductor technology. The computer system is designed for flexibility to enable construction of different system configurations without redesign or modification to any of the following subsystems: (1) Processor Subsystem, (2) Input/Output Subsystem, (3) Memory Subsystem, (4) Power Supply Subsystem, and (5) Chassis Subsystem. The AN/AYK-14(V) uses the Machine Transferrable AN/UYK-20 AN/AYK-14(V) Support Software developed for the AN/UYK-20, and implements an instruction set that is compatible with the AN/UYK-20, the standard mini-computer for Navy shipboard use. The following AN/AYK-14(V) applications have been identified: F/A-18, LAMPS MK III, EP-3B/E, FIREBRAND, AV-8B, EA-6B, E-2C, P-3C, Stand-Off Target Acquisition System (Army), Advanced Lightweight Torpedo, Carrier Aircraft Inertial Navigation System, Digital Acoustic Simulator System, Tactical Air Operations Center, Marine Integrated Fire and Air Support System, and Automatic Carrier Landing System. The project is of a continuing nature to permit technology infusion which will extend the life of the AN/AYK-14(V) as a viable standard computer alternative to new developments.

(U) RELATED ACTIVITIES: This effort is coordinated with the AN/UYK-20(V) Project Office to assure software compatibility between the AN/AYK-14(V) and the AN/UYK-20(V) computer systems.

(U) WORK PERFORMED BY: In-House: Naval Avionics Center, Indianapolis, IN (lead laboratory); Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Electronic Systems Command, Washington, D.C. Contractor: Control Data Corporation, Minneapolis, MN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The program was initiated in April 1976 with a competitive source selection. The resultant development contract awarded to Control Data Corporation in September 1976 is Cost Plus Incentive Fee for design, development, test, delivery of test units and preproduction units, data, and contractor support. The initial "Brassboard" computer delivery to the Navy for use by the F/A-18 Project occurred in May 1977. Delivery of preproduction units for support of

Project: W0845 Title: AN/AYK-14(V)
Program Element: 64203N Title: Avionics Development
DoD Mission Area: 238 - Other Naval Warfare Budget Activity: 4 - Tactical Programs

user RDT&E requirements began in October 1977. Contractor Design Approval Tests (environmental tests) were successfully concluded in December 1977. The Navy Technical Evaluation (DT-IIB) and Operational Test and Evaluation (OT-IIA) flight testing were successfully completed. Commander Operational Test and Evaluation Force recommended continued development and continued united production to support user system development. Contractor Reliability Development Tests (10,500 hours mission profile Test, Analyze and Fix) were completed in September 1979 and a baseline design freeze achieved. The maintainability demonstration has been successfully completed. Retrofit of pre-production computers to baseline configuration has been initiated. Implementation of second source program Leader/Follower Procurement approach has been initiated. Development and testing of additional standard modules and computer configurations for new users continued. Interim logistics support continued as integrated operational logistics support planning and development matured.

2. (U) FY 1982 Program: Complete delivery of preproduction units for use by user projects. Continue interim support of delivered preproduction systems. Complete preproduction tests. Continue Retrofit-to-Baseline for preproduction hardware. Continue development of Second Source using the Leader/Follower Procurement approach. Develop, test and qualify standard components for new user applications. Formulate candidate development proposals for infusion of new technology into AN/AYK-14(V) forward fit and/or retrofit. Continue development of integrated logistic support elements. Continue development of preliminary technical publications (intermediate level-of-maintenance).

3. (U) FY 1983 Planned Program: Continue production deliveries to meet minimum user requirements. Based on their respective Operational Evaluations, the EA-6B, LAMPS MK III and F/A-1^ weapon systems will obtain Approval for Service Use with the AN/AYK-14(V) and applicable operational software as an embedded computer system. Continue retrofit-to-baseline for preproduction units. Continue interim contractor support. Continue implementation of expanded production capacity. Develop, test and qualify standard components for new user applications. Initiate development of selected new technology infusion projects for forward fit and/or retrofit. Continue development of intermediate level of maintenance technical publications and begin development of depot level of maintenance technical publications. Continue provisioning to meet material support date, second quarter FY 1984. Continue ground support equipment and test program set development. First fleet delivery of intermediate level test set (Memory Loader/Verifier) and Category IIID automatic test equipment will occur. Complete factory training on Memory Loader/Verifier and Category IIID automatic test equipment. Complete Electromagnetic Compatibility system tests.

4. (U) FY 1984 Planned Program: Continue implementation of logistics elements until material support date, third quarter FY 1984. Complete intermediate and depot level of maintenance technical publications. Complete deliveries of retrofitted computers. Continue implementation of Second Source development by the Leader/Follower Procurement approach. Continue development, testing and qualification of additional standard components for new user applications. Continue contractor interim support until Navy Support Date in first quarter FY 1985.

Project: W0845
Program Element: 64203N
DoD Mission Area: 238 - Other Naval Warfare

Title: AN/AYK-14(V)
Title: Avionics Development
Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

7. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0845	AN/AYK-14(V)	6,353	11,296	7,429	1,655	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64211N

Title: AIMS/ATCRBS/MARK XII (Aircraft Identification Monitoring System/ Air Traffic Control Radar Beacon/MARK XII)

DoD Mission Area: 344 - Tactical Command and Control

Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,152	4,363	6,228	8,650	Continuing	Continuing
W0454	Identification Friend or Foe/MARK XII	1,628	2,034	1,764	1,796	Continuing	Continuing
X0676	Shipborne Identification Friend or Foe/MARK XII	1,524	2,329	4,464	6,854	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element covers the Navy portion of a tri-service military program to provide positive identification of friendly combat units including NATO forces. The existing systems appear vulnerable to certain sophisticated forms of electronic countermeasures and must be modified (or improved) to reduce or eliminate the effects of such tactics. The operational needs of the military forces to use Identification Friend or Foe MK XII systems will continue through the 1990's. It is essential to develop methods to decrease the existing vulnerability and increase the system reliability.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Fabricate and evaluate engineering test models of several promising improvements to determine their performance against electronic countermeasures. Initiate program to implement these improvements into production and existing hardware. A decrease from FY 1982 to FY 1983 of $270 in W0454, Identification Friend or Foe/MARK XII, was in response to mandated budget reductions. An increase of $2,135 in X0676, Shipborne Identification Friend or Foe/MARK XII, is due to increased development and testing costs of shipboard engineering development models, the need to initiate procedures to incorporate the MARK XV system (being developed in PE 63267N, Combat Identification System) as part of ships' identification systems. Detailed direction of this program is dependent on the outcome of a Defense Systems Acquisition Review Council I for the Combat Identification System, scheduled for July 1982. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are: W0454, Identification Friend or Foe/MARK XII - Minus $906 in FY 1981 was reprogrammed to support a higher priority effort, and minus $129 in FY 1982 and minus $65 in FY 1983 because of routine budget adjustments. For X0676, Shipborne Identification Friend or Foe/MARK XII - Minus $12 in FY 1981 and minus $32 in FY 1982 because of routine budget adjustments, and minus $604 in FY 1983 in response to mandated budget reductions.

Program Element: 64211N

Title: AIMS/ATCRBS/MARK XII (Aircraft Identification Monitoring System/ Air Traffic Control Radar Beacon/MARK XII)

DoD Mission Area: 344 - Tactical Command and Control

Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,168	4,070	4,524	6,897	Continuing	Continuing
W0454	Identification Friend or Foe/MARK XII	2,301	2,534	2,163	1,829	Continuing	Continuing
X0676	Shipborne Identification Friend or Foe/MARK XII	867	1,536	2,361	5,068	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 64211N

Title: AIMS/ATCRBS/MARK XII (Aircraft Identification Monitoring System/ Air Traffic Control Radar Beacon/MARK XII)

DoD Mission Area: 344 - Tactical Command and Control

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION:

W0454: Identification Friend or Foe/MARK XII - Introduction of the Mark XII systems into Air Force, Army, and Navy forces started in 1963. Currently the United States, Germany, Canada, Belgium, and the Netherlands are the NATO countries employing the Mark XII system. Other NATO countries are considering the Mark XII system but are awaiting the development of improvements against enemy jamming and exploitation and the timing of the development of the MK XV which is intended to replace the MK XII in the future. The following efforts are scheduled to be accomplished under this program: (1) conduct a mutually agreed threat assessment; (2) assess the qualitative/quantitative vulnerability of the existing Mark XII systems; (3) develop and evaluate potential system improvements; and (4) assist in the tri-service recommendation to The Office of the Under Secretary of Defense for Research and Engineering for the procurement and technical evaluation of engineering models to verify the suitability of the improved MK XII systems.

X0676: Shipborne Identification Friend or Foe/MARK XII - Shipboard systems have unique coordination requirements with multiple radar systems. These necessitate additional MK XII improvements, in the form of automatic threat evaluation through a central Identification Friend or Foe MK XII system interfacing with special purpose systems such as weapon systems (AEGIS) and Navy Tactical Data Systems. Shipboard interface equipment (antenna and processor) for the new MK XV Combat Identification System will be developed.

(U) RELATED ACTIVITIES: These development programs are tri-service coordinated with the Air Force acting as Executive Agent. Also participating are the National Security Agency, the Department of Transportation, and some of the NATO countries.

(U) WORK PERFORMED BY: Naval Research Laboratory, Washington, D.C.; Naval Ocean Systems Center, San Diego, CA; Naval Avionics Center, Indianapolis, IN; Naval Electronics Systems Engineering Activity, St. Inigoes, MD; MITRE Corporation, McLean, VA; Bendix Corporation, Towson, MD; Hazeltine Corporation, Greenlawn, NY; Vitro Laboratory, Wheaton, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0454: Identification Friend or Foe/MARK XII - MITRE Corporation initiated a vulnerability assessment. The Naval Research Laboratory, the Naval Ocean Systems Center, and the Naval Avionics Center all initiated vulnerability studies and concepts for improvements. Several contract awards were made to determine hardware techniques for achieving the required amount of improvements. Testing of existing systems was accomplished to obtain data for comparison against future improvements.

Program Element: 64211N

Title: AIMS/ATCRBS/MARK XII (Aircraft Identification Monitoring System/ Air Traffic Control Radar Beacon/MARK XII)

DoD Mission Area: 344 - Tactical Command and Control

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION:

W0454: Identification Friend or Foe/MARK XII - Introduction of the Mark XII systems into Air Force, Army, and Navy forces started in 1963. Currently the United States, Germany, Canada, Belgium, and the Netherlands are the NATO countries employing the Mark XII system. Other NATO countries are considering the Mark XII system but are awaiting the development of improvements against enemy jamming and exploitation and the timing of the development of the MK XV which is intended to replace the MK XII in the future. The following efforts are scheduled to be accomplished under this program: (1) conduct a mutually agreed threat assessment; (2) assess the qualitative/quantitative vulnerability of the existing Mark XII systems; (3) develop and evaluate potential system improvements; and (4) assist in the tri-service recommendation to The Office of the Under Secretary of Defense for Research and Engineering for the procurement and technical evaluation of engineering models to verify the suitability of the improved MK XII systems.

X0676: Shipborne Identification Friend or Foe/MARK XII - Shipboard systems have unique coordination requirements with multiple radar systems. These necessitate additional MK XII improvements, in the form of automatic threat evaluation through a central Identification Friend or Foe MK XII system interfacing with special purpose systems such as weapon systems (AEGIS) and Navy Tactical Data Systems. Shipboard interface equipment (antenna and processor) for the new MK XV Combat Identification System will be developed.

(U) RELATED ACTIVITIES: These development programs are tri-service coordinated with the Air Force acting as Executive Agent. Also participating are the National Security Agency, the Department of Transportation, and some of the NATO countries.

(U) WORK PERFORMED BY: Naval Research Laboratory, Washington, D.C.; Naval Ocean Systems Center, San Diego, CA; Naval Avionics Center, Indianapolis, IN; Naval Electronics Systems Engineering Activity, St. Inigoes, MD; MITRE Corporation, McLean, VA; Bendix Corporation, Towson, MD; Hazeltine Corporation, Greenlawn, NY; Vitro Laboratory, Wheaton, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0454: Identification Friend or Foe/MARK XII - MITRE Corporation initiated a vulnerability assessment. The Naval Research Laboratory, the Naval Ocean Systems Center, and the Naval Avionics Center all initiated vulnerability studies and concepts for improvements. Several contract awards were made to determine hardware techniques for achieving the required amount of improvements. Testing of existing systems was accomplished to obtain data for comparison against future improvements.

Program Element: 64211N

Title: AIMS/ATCRBS/MARK XII (Aircraft Identification Monitoring System/ Air Traffic Control Radar Beacon/MARK XII)

DoD Mission Area: 344 - Tactical Command and Control

Budget Activity: 4 - Tactical Programs

X0676: Shipborne Identification Friend or Foe/MARK XII - Vulnerability of shipboard MK XII system was evaluated. Several candidate improvements have been identified and engineering test models are being fabricated. These are Anti-Jam Receiver, Mode 4 Evaluator, and 3-Pulse Decoder. Initiated Small Ship Central MK XII system evaluation and new Aircraft Identification Monitoring Systems test set development. Also initiated software improvements between the AN/UPX-29 Central MK XII system and AEGIS Weapon System Computer. Principal support effort was from the Naval Research Laboratory, Naval Ocean Systems Center, Naval Electronic Systems Engineering Activity, Bendix Corporation, and Vitro Laboratory.

2. (U) FY 1982 Program:

W0454: Identification Friend or Foe/MARK XII - Coordinate MITRE Corporation vulnerability assessment with the other U. S. participants. Select technical candidates for prototyping that have the most potential for achieving the required improvement levels. Award contracts to fabricate these improvements.

X0676: Shipborne Identification Friend or Foe/MARK XII - Fabricate 3-pulse Decoder and Mode 4 Anti-Jam engineering test models. Perform shipboard test and evaluation of Mode 4 Evaluator and Anti-Jam Receiver. Continue to investigate new and promising techniques that will reduce electronic warfare vulnerability and improve system performance and reliability. Continue development of Small Ship Central MK-XII System and new Aircraft Identification Monitoring Systems Test Set.

3. (U) FY 1983 Planned Program:

W0454: Identification Friend or Foe/MARK XII - Test hardware prototype to determine levels of improvement obtained. Develop Mode evaluator for F-14 interrogation and classification process. Initiate effort to integrate the MK-XII interrogation and classification data with other information to improve the overall identification process for the E2C. Provide recommendations to the Office of the Secretary for Defense for changes to production hardware.

X0676: Shipborne Identification Friend or Foe/MARK XII - Continue investigation and evaluations of electronic warfare vulnerability improvements. Continue the development of the Small Ship Central MK XII System. Test and evaluate new Aircraft Identification Monitoring Systems Test Set and other promising improvements. An increase of $2,135 over FY 1982 is due to increased developmental and testing costs of shipboard engineering test models, and to develop shipboard interface equipment for the MARK XV Combat Identification System.

Program Element: 64211N

Title: AIMS/ATCRBS/MARK XII (Aircraft Identification Monitoring System/ Air Traffic Control Radar Beacon/MARK XII)

DoD Mission Area: 344 - Tactical Command and Control

Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program:

W0454: Identification Friend or Foe/MARK XII - Complete test and evaluation of the improved hardware. Continue E2C identification system integration effort.

X0676: Shipborne Identification Friend or Foe/MARK XII - Conduct test and evaluation of Small Ships Central MK-XII System. Continue investigations and evaluations of electronic warfare vulnerability improvements. Continue development of shipboard interface equipment for new MARK XV Combat Identification System.

5. (U) Program to Completion: This is a continuing program providing technical support to the tri-service coordinated program.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64212N
Title: Light Airborne Multi-Purpose System (LAMPS) MK III
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	100,842	72,588	8,977	0	0	769,584
W0474	Light Airborne Multi-Purpose System MK III	99,564	72,588	8,977	0	0	755,341
	Quantity (Test and Evaluation)						(8)
S1087	Light Airborne Multi-Purpose System MK I Shipboard Subsystem	648	0	0	0	0	2,729
W0973	Recovery Assist, Securing, and Traversing System	630	0	0	0	0	11,514

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Light Airborne Multi-Purpose System (LAMPS) MK III is a computer integrated ship/ helicopter system that increases the effectiveness of surface combatants and is optimized for anti-submarine warfare. Light Airborne Multi-Purpose System MK III has a secondary mission of anti-ship surveillance and targeting. A helicopter provides a remote platform for deployment of sonobuoys and torpedoes, processing of acoustic and magnetic anomaly detection sensor information, and an elevated platform for radar and electronic support measures. The ship provides sensor processing, command and control, and integrates all Light Airborne Multi-Purpose System information gained from various sensors. The ship also provides the Recovery Assist, Securing and Traversing System as well as visual landing aids, and maintenance and support facilities for the aircraft. Light Airborne Multi-Purpose System MK I provides an anti-submarine warfare capability for older surface combatants not equipped with the MK III system.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Light Airborne Multi-Purpose System MK III full scale development level of activity will decline considerably in FY 1983 as the program moves into the production phase. In FY 1983 the major development effort will be redesign and test of minor changes to wrap up the full scale development program. The above funding includes escalation and encompasses all work or development phases now planned or anticipated through FY 1983 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflect a decrease of 4,293. The factors include a prior year expenditure adjustment of -370. In FY 1981, the program was assessed -1,421 in reductions (1,116 by Navy for inflation/economics/ travel and 305 for other assessments). In FY 1982 the program was decreased by deescalation of -940 in the March Supplement/ Amendment, -124 management action, and -1,194 as the Navy distribution of a DoD-wide reduction for consultants, analyses and management support. FY 1983 decreased by -244 (-201 for deescalation and -43 for management support).

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System (LAMPS) MK III
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	178,749	102,263	74,846	9,221	0	773,877
W0474	Light Airborne Multi-Purpose System MK III	170,433	101,606	74,846	9,221	0	760,330
	Quantity (Test and Evaluation)						(8)
S1087	Light Airborne Multi-Purpose System MK I Shipboard Subsystem	1,022	657	0	0	0	2,738
W0973	Recovery Assist, Securing, and Traversing System	7,294	0	0	0	0	10,809

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	Aircraft Procurement, Navy*	105,000**	727,300	1,231,600	1,329,800	1,208,400	4,602,100
	Quantity		(18)	(48)	(64)	(74)	(204)
	Other Procurement, Navy*		39,749	81,723	79,142	258,300	458,914
	Quantity		(4)	(10)	(11)	(31)	(56)
	Operations and Maintenance, Navy (Fleet Modernization Program)				13,576	859,300	872,876
	Military Construction			12,500	9,000	0	21,500
	Shipbuilding and Conversion, Navy	***	***	***	***	***	***
	Quantity	(16)	(6)	(5)	(5)	(22)	(54)

* Amount includes spares
** Advance Procurement
*** Costs for 54 systems currently programmed at approximately $699.4 million. Cost breakdown by year is reflected in Shipbuilding and Conversion, Navy appropriations under ship acquisition program elements.

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System (LAMPS) MK III
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Light Airborne Multi-Purpose System development is required to provide cruiser, destroyer and escort ships with anti-submarine warfare and limited anti-ship surveillance and targeting capabilities beyond the ranges of the current surface ship sensors and weapons. LIGHT AIRBORNE MULTI-PURPOSE SYSTEM MK III, WO474 is a computer integrated ship/helicopter system that increases the effectiveness of surface combatants and is optimized for anti-submarine warfare. Utilizing an SH-60B helicopter with a gross take-off weight of approximately 20,000 pounds, MK III provides a remote platform for deployment of sonobuoys and torpedoes, processing of acoustic data and magnetic anomaly detection sensor information and an elevated platform for radar and electronic warfare support measures. The ship provides sensor processing, command and control, and integrates light airborne multi-purpose system information gained with other sensors. MK III will provide anti-submarine warfare redetection, localization, classification and weapons delivery at ranges beyond the current capability of the parent ship. A secondary mission of the MK III system will be the limited capability to detect and identify missile firing surface platforms beyond the range of parent ship sensors. The mission goal for the MK III system in the anti-submarine warfare role is to have the SH-60B be capable of remaining on station [redacted] Research, Development, Test and Evaluation, Navy funding for this project provides for development of new airborne and shipboard equipment where necessary, the integration of the aircraft/ship system and testing through the completion of initial operational test and evaluation. This funding provides for the acquisition of prototype MK III systems required for use at the Navy Preliminary Evaluation, Board of Inspection and Survey trials and the Operational Evaluation which will complete MK III system initial operational test and evaluation. LIGHT AIRBORNE MULTI-PURPOSE SYSTEM MK I, SHIPBOARD SUBSYSTEM, S1087 employs a 12,000 pound SH-2F helicopter (now in service use) which evolved from the modification of in-service H-2 helicopters and surface ships by installation of essentially off-the-shelf airborne and shipboard equipments to provide an immediate, though limited, Light Airborne Multi-Purpose System capability to the fleet. Development, test and evaluation effort is directed towards continued development of the SQR-17 shipboard acoustic processor. RECOVERY ASSIST, SECURING and TRAVERSING SYSTEM, WO973 will facilitate safe launch, recovery, and deck-handling, including hangaring of Light Airborne Multi-Purpose System MK III helicopters in conditions as severe as sea state five. The Recovery Assist, Securing and Traversing System is a modification of the Canadian BEARTRAP which has over 10 years of service operation in Canada. Canada participated in development of the Recovery Assist, Securing and Traversing System and underwrote a portion of the development costs.

(U) RELATED ACTIVITIES: Program Element 64206A, UH-60A, BLACKHAWK, (Utility Tactical Transport Aircraft System), a derivative of which has been selected for the Light Airborne Multi-Purpose System MK III airframe. Program Element 64750A, EH-60A QUICKFIX and Program Element 64748A, EH-60B Stand-Off Target Acquisition System (SOTAS) are derivatives of the BLACKHAWK airframe. Program Elements 64203N, AN/AYK-14 Standard Airborne Computer; 64266N, AN/UYS-1 Advanced Signal Processor; 64518N, AN/UYQ-21 Tactical Data System; and 64713N, AN/SQR-19 Tactical Towed Array Sonar will be used in Light Airborne Multi-Purpose System MK III. Program Elements 24224N, FFG-7 Class Guided Missile Frigate; 24223N, DD-963 Class Spruance Destroyer; 24222N, DDG-993 Class Kidd Destroyer; and 24221N, CG-47 Class Aegis Cruiser will receive the Light Airborne Multi-Purpose System MK III.

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DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System (LAMPS) MK III
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: IN-HOUSE: Naval Air Development Center, Warminster, PA; Naval Air Engineering Center, Lakehurst, NJ; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Naval Underwater Systems Center, New London, CT; Naval Air Test Center, Patuxent River, MD; Naval Avionics Center, Indianapolis, IN; Naval Air Propulsion Center, Trenton, NJ; Naval Weapons Engineering Support Activity, Washington, DC; Naval Personnel Research and Development Center, San Diego, CA; Naval Engineering Support Office, Pensacola, FL; and Naval Engineering Support Office, Cherry Point, NC. CONTRACTORS: International Business Machines, Owego, NY (MK III System Prime); Sikorsky, Stratford, CT (Air Vehicle); General Electric, Lynn, MA (Engine); Canadian Commercial Corporation, (DAF Indal) Ottawa, Canada, (Recovery Assist, Securing and Traversing System); Control Data Corporation, Minneapolis, MN (AYK-14); International Business Machines, Manassas, VA (UYS-1); Collins Radio, Cedar Rapids, IA (ARC-159, ARN-118 and ARC-174); Sperry-Univac, St. Paul, MN (UYK-7, UYK-20, and USQ-69); and Bendix, Towson, MD (APX-100).

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed technical investigations and conceptual demonstrations which proved the feasibility of operating helicopters from surface combatants in the primary anti-submarine warfare and secondary anti-ship surveillance and targeting mission roles. The early development efforts also provided the baseline and concept demonstration of a fully integrated, state-of-the-art system to meet the complete Light Airborne Multi-Purpose System requirement and these efforts evolved into Light Airborne Multi-Purpose System MK III. A short range baseline version of the Light Airborne Multi-Purpose System MK III System was designed, developed, fabricated and tested through a series of laboratory, shore-based, range and open-ocean tests. These culminated in highly successful demonstrations in the at-sea operational environment in 1976 and a follow-on development program resulting in a long lead avionics design effort. The successful extended mission testing utilizing H-3 test beds with functionally representative avionics and shipboard electronics preceded award of the Full Scale Development contracts for the acquisition of the five SH-60B prototypes and three ship electronic systems, one of which was installed in the test ship, USS MCINERNEY. Full Scale Development testing including laboratory demonstrations on both the aircraft avionics and ship electronics systems, contractor demonstrations and Navy Development Test and Evaluation preceded release of the system to the Commander Operational Test and Evaluation Force for Operational Evaluation IIA (OT-IIA). Light Airborne Multi-Purpose System MK I Shipboard Subsystem, AN/SQR-17 - Contracted for a prototype Directional Frequency Analysis and Recording/Directional Command Active Sonobuoy System processor using AN/SQR-17 assets. Conducted design certification testings and reliability/maintainability demonstrations on MK I SQR-17 at contractor facility and completed technical evaluation of SQR-17 (V)4 as part of MK I shipboard subsystem. Recovery Assist, Securing and Traversing System - Awarded incrementally funded contract to Canadian Commerical Corporation (DAF Indal) for technical investigations, design, development, fabrication and test of two Recovery Assist, Securing and Traversing service models; conducted preliminary evaluations related o shore-based development testing on one of the models; and completed installation of the other model aboard the test ship (USS McInerney FFG-8). Successfully completed developmental and operational evaluation of the Shipboard Recovery Assist, Securing and Traversing system.

am Element: 64212N
ission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System (LAMPS) MK III
Budget Activity: 4 - Tactical Programs

(U) FY 1982 Program: Continue incremental funding of prime contractors toward completion of full scale development; develop n trainer requirements; develop, test and correct deficiencies resulting from operational evaluation; finalize the test atory requirements necessary for integration of the LAMPS MK III ship system on board the various ship classes; and fund activity efforts in support of ongoing technical and operational tests.

U) FY 1983 Planned Program: Complete development and verification of corrections resulting from final test activity and fund activity efforts in support of completion of full scale development.

(U) FY 1984 Planned Program: Commence delivery of production aircraft. Achieve initial operating capability on MK III n system and on fully integrated MK I system including SQR-17.

U) Program to Completion: Continue delivery of production aircraft and ship systems.

U) Milestones:

Milestone (MK III)		Date
. Project initiation - Tentative Specific Operational Requirement		February 1969
. Program redirection		March 1971
. Complete initial test bed validation phase		June 1972
. Select system prime contractor (phase I system integration)		April 1974
. Complete at-sea development test (short range system)		November 1975
. Issue request for quotation for prototype aircraft		June 1976
. Complete at-sea development test (extended mission system)		December 1976
. Award sustaining engineering contracts		September 1977
. Award full scale development contracts (prototype system and system prime (phase III))		February 1978
. First prototype aircraft delivery		November 1979
. Complete prototype ship system delivery		November 1979
. Complete Navy preliminary evaluation	(July 1981)*	October 1981
. Award Aircraft pilot production contract (Advance Acquisition Contracts/Definitize)	(October 1981)*	April 1981/June 1982
. Complete Board of Inspection and Survey Trials		January 1982
. Complete initial operational evaluation		January 1982
. Award full production contracts (Advance Acquisition Contracts/Definitize)	(October 1982)*	December 1981/May 1983
. First production ship system delivery		July 1983
. First production aircraft system delivery		October 1983
. Initial operating capability		

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System (LAMPS) MK III
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*Date shown in FY 1982 Program Element Descriptive Summary. The additional Navy preliminary evaluation is required to test corrections to previously identified discrepancies. New dates for pilot and production contracts more correctly define the contract process.

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System MK III
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA

1. (U) Development Test and Evaluation

(U) Development Test and Evaluation Accomplished to Date:

(U) Feasibility of the Light Airborne Multi-Purpose System concept was originally demonstrated during the period May 1969 to August 1973 using two specially modified Naval Air Development Center HH-2D helicopters and the USS FOX (DLG-33). Using one helicopter as a remote platform, the anti-submarine warfare sensor data obtained was data linked to the ship for processing, display and interpretation. In addition, the anti-ship surveillance and targeting capability was demonstrated aboard a separate helicopter with radar and electronic support measures information data linked to the ship for evaluation.

(U) In December 1973, two specially modified Navy YSH-2E helicopters demonstrated the use of combined anti-submarine warfare and anti-ship surveillance and targeting sensors aboard a single aircraft. Successful prosecution of a submerged target in deep water was achieved[redacted]

(U) During the spring and fall of 1974, an SH-2F, in conjunction with a P-3 ORION, demonstrated a Light Airborne Multi-Purpose System over-the-horizon targeting capability well within the requirement of both the HARPOON and the STANDARD active surface-to-surface missile systems.

(U) In April 1974, the Navy selected International Business Machines Corporation as the Light Airborne Multi-Purpose System MK III system prime contractor. In September 1974, a memorandum of understanding for a joint Army/Navy test program was signed which allowed the Navy to obtain significant Utility Tactical Transport System/Light Airborne Multi-Purpose System data throughout the Army's test program. Subsequently, the Navy participated in the Army Preliminary Evaluation on both the Boeing Vertol YUH-62A and the Sikorsky YUH-60A.

(U) From January 1976 to December 1976, the system prime contractor and the Naval Air Development Center modified and tested two YUH-3J helicopters ashore and at-sea. These aircraft carried the complete H-3 extended mission avionics suite. The testing included laboratory demonstrations, shore based testing at the Atlantic Undersea Test and Evaluation Center and an open ocean period aboard the USS MOUNT BAKER (AE-34). Results of the at-sea testing indicated that the Light Airborne Multi-Purpose System has the ability [redacted]
contact at ranges

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(U) Since 1977, three Navy preliminary evaluations of the MK III system have been conducted to substantiate the basic flight envelope. These Navy preliminary evaluations were conducted by Navy personnel at the Naval Air Test Center, Patuxent River, MD and at the Naval Air Engineering Center, Lakehurst, NJ. Preliminary Evaluation (IA) primarily tested aircraft flying qualities and performance. Preliminary Evaluation (IB) demonstrated aircraft capability with the Recovery Assist, Securing and Traversing System. Preliminary Evaluation (IN) successfully demonstrated the aircraft's initial night, all weather capability.

(U) In December 1980, Preliminary Evaluation (IC) was completed and proved the aircraft was ready to operate with USS MCINERNEY (FFG-8) at sea. In January 1981, the first SH-60B went to sea aboard the USS MCINERNEY and successfully operated with the Recovery Assist, Securing and Traversing system up to state 5 seas. In February 1981, two SH-60B's were embarked aboard USS MCINERNEY for Preliminary Evaluation (II) which successfully demonstrated the MK III Weapon System full anti-submarine warfare capability.

(U) Future Development Test and Evaluation

(U) The remaining preliminary evaluation (III) will review all aircraft, engine, avionics and the shipboard subsystems and will be the basis for certifying this system ready for service acceptance trials and operational evaluation. Five test aircraft, two ship electronic systems and two Recovery Assist, Securing and Traversing systems will be utilized during the test period. Details of the Development Test and Evaluation schedules and planning are contained in the MK III Test and Evaluation Master Plan 189, Revision B of May 1981.

2. (U) Operational Test and Evaluation

(U) Operational Test and Evaluation Accomplished to Date:

(U) Projects were accomplished during the period November 1973 to May 1975 utilizing a P-3C system modified to simulate Light Airborne Multi-Purpose System MK III and a Light Airborne Multi-Purpose System MK I (SH-2F) helicopter with its LN-66 radar operating from a FF-1052 class ship. The objectives of these tests were to assess the anti-submarine warfare capabilities of the proposed Light Airborne Multi-Purpose System MK III using equivalent avionics and sensor capabilities. Commander, Operational Test and Evaluation Force concluded that the Light Airborne Multi-Purpose System MK III concept was viable and recommended continued development.

(U) From May to November 1975, Initial Operational Test and Evaluation was conducted with tests of the short range mission of the Light Airborne Multi-Purpose System MK III. The test was conducted utilizing one YSH-2E test-bed aircraft and the USS CONNOLE (FF-1056) with developmental Light Airborne Multi-Purpose System MK III electronics equipment installed and integrated with the

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ship's sonar, radar, and electronic support measures equipment. During the at-sea tests the H-2 (short range) system effectively localized and obtained attack criteria[redacted] Commander, *Operational Test and Evaluation Force* recommended that development of Light Airborne Multi-Purpose System MK III be continued.

(U) During April 1976 to December 1976, extended mission testing was conducted utilizing two YSH-3J test-bed helicopters with functionally representative avionics and shipboard electronics. Specific objectives of the at-sea tests (1-10 December 1976) aboard the USS MOUNT BAKER (AE-34) were to assess the capability of the Light Airborne Multi-Purpose System MK III advanced development system to redetect, classify, localize, and attack submarine contacts[redacted] in both ship-dependent and independent modes; additionally to assess the capability of the Light Airborne Multi-Purpose System MK III H-3 (extended mission) system to provide over-the-horizon targeting using electronic support measures and radar. As a result of these successful tests, Commander, Operational Test and Evaluation Force recommended that the Light Airborne Multi-Purpose System MK III with the extended mission capability should be approved for full-scale development.

(U) Commander Operational Test and Evaluation Force conducted MK III initial operational tests (OT-IIA) and Recovery Assist, Securing and Traversing system Operational Evaluation from May to June 1981 with two preproduction prototype mission equipped SH-60B helicopters. USS MCINERNEY (FFG-8) with MK III shipboard electronics and Recovery Assist, Securing and Traversing system installed was the test platform. Tests were conducted in the vicinity of Bermuda[redacted] from USS MCINERNEY to assess the capability of the MK III system to redetect, classify, localize, and achieve attack criteria in independent and dependent modes; to assess the capability of the MK III to provide over-the-horizon targeting using Electronic Support Measures and radar; and to determine the operational effectiveness and operational suitability of the Recovery Assist, Securing and Traversing system in sea states through 5. As a result of these limited tests and observation of corrected deficiencies, Commander Operational Test and Evaluation Force recommended that the MK III continue with initial procurement and that the Recovery Assist, Security and Traversing system be provisionally approved for service use.

(U) As a result of these limited tests, Commander Operational Test and Evaluation Force observed the following systems characteristics in the primary anti-submarine warfare and anti-ship surveillance and targeting mission environment:

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a. Missions

Primary - Anti-Submarine Warfare

	Milestone IIIB Threshold	Demonstrated*
P_r (Probability of redetection and classification given valid trigger)	[redacted]	[redacted]
P_l (Probability of localization to within 3 nautical miles given correct classification)		
P_a (Probability of attack criteria to within 800 yards given localization)		

Secondary - Anti-Ship Surveillance and Targeting

P_d (Probability of detection)	[redacted]
P_c (Probability of correct classification)	
P_t (Probability of over-the-horizon targeting)	
DRA (Detection Range Advantage)	

(U) Also as a result of these limited tests, Commander Operational Test and Evaluation Force observed the following system characteristics in the areas of availability, reliability and maintainability.

	Milestone IIIB Threshold	Demonstrated*
a. Operational Availability		
Total System (%)	[redacted]	[redacted] (o)
Anti-Submarine Warfare (%)		(o)
Secondary Missions (%)		(o)
Downtime Rate (hour/flight hour)		(o)

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System MK III
Budget Activity: 4 - Tactical Programs

b. Reliability

Anti-Submarine Warfare			
Probability of Success (%)	[	]	(o)
Mean Time Between Critical Failure (Hours)	[	]	(o)
Anti-Ship Surveillance and Targeting			
Probability of Success (%)	[	]	(o)
Mean Time Between Critical Failure (Hours)	[	]	(o)
Mean Flight Hours Between Failures			
SH-60B Avionics (Hours)	[	]	(o)
SH-60B Non-Avionics (Hours)	[	]	(o)
Ship Electronics (Hours)	[	]	(o)

c. Maintainability (Organizational Level Unscheduled)

Mean Time to Repair			
SH-60B Non-Avionics (Hours)	[	]	(o)
SH-60B Avionics (Hours)	[	]	(o)
Ship Electronics (Hours)	[	]	(o)
Direct Maintenance Manhours/Flight Hour			
SH-60B Non-Avionics (Hours)	[	]	(o)
SH-60B Avionics (Hours)	[	]	(o)
Direct Unscheduled Maintenance Manhours/Operating Hours			
Ship Electronics (Hours)	[	]	(o)
Probability of Automatic Fault Detection			
SH-60B Avionics (%)			(n)
Ship Electronics (%)			(n)
Probability of Automatic Fault Isolation			
SH-60B Avionics (to one module) (%)			(n)
Ship Electronics (to three modules) (%)			(n)

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System MK III
Budget Activity: 4 - Tactical Programs

(U) Future Operational Test and Evaluation:

(U) Formal operational evaluation, Operational Test (IIB), will be conducted from October 1981 through January 1982, utilizing the same equipment (air and surface) as Operational Test (IIIA). Successful accomplishment of Operational Test (IIB) will allow Commander, Operational Test and Evaluation Force to make a recommendation regarding approval for service use for the Light Airborne Multi-Purpose System MK III system. Operational Test (IIB) will be identical to Operational Test (IIA), except that IIB will provide a larger sample-size and increased scope of operations from which operational performance can be demonstrated to the degree necessary to support a full scale production decision at MILESTONE IIIB.

(U) Follow-on Test and Evaluation: Operational Test (III) will be conducted with the prototypes, modified as necessary, to incorporate fixes resulting from Board of Inspection and Survey and Operational Test (IIB). Objectives of Operational Test (III) will include testing of fixes to be incorporated in production systems, completion of any deferred or incomplete Initial Operational Test and Evaluation tests and continuing tactics development. Operational Test (OT-III) will be conducted on representative Light Airborne Multi-Purpose System MK III ships (FFG-7, DD-963 and CG-47).

(U) Operational Test (IV) will be conducted using production Light Airborne Multi-Purpose System MK III systems. This testing will demonstrate program objectives for production system operational effectiveness and operational suitability. Additional determination of performance of the Light Airborne Multi-Purpose System MK III system in new environments, new applications and against new threats will be made.

3. (U) System Characteristics

(U) The thrust of the Light Airborne Multi-Purpose System MK III development program is the development of airborne and shipboard systems; that is, sensors, data links, data processors and tactical displays to meet mission requirements for anti-submarine warfare and limited anti-ship surveillance and targeting. The Light Airborne Multi-Purpose System MK III helicopter (SH-60B) is a derivative of the Army BLACKHAWK (UH-60A). SH-60B helicopters are planned to operate from existing MK III fleet ships and ships currently being built or planned for construction. The following characteristics apply to the Light Airborne Multi-Purpose System MK III system and represent the latest information available:

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System MK III
Budget Activity: 4 - Tactical Programs

System Characteristics	Milestone IIIB Threshold	Demonstrated**
a. Light Airborne Multi-Purpose System MK III		
(1) Missions		
Primary - Anti-Submarine Warfare		1981 (o, d)
Secondary - Anti-Ship Surveillance and Targeting		1981 (d)
Search and Rescue		
Vertical Replenishment		
Medical Evacuation		
Communications Relay		1981 (o, d)
(2) Operating Capability	Sea State 4 required 5 desired	5 (d)
(3) Helicopter Time-on-Station	Hours	
[ ]nautical miles	[ ]	[ ] (o, d)
[ ]nautical miles		[ ] (o, d)
(4) Helicopter Dash Speed (knots)	125	128 (d, c)
(5) Radar Detection Range	Nautical Miles	
Surface Threat Cross Section		
[ ]square meters	[ ]	[ ] (c-1)
[ ]square meters		[ ] (c-1)

Program Element: 64212N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Light Airborne Multi-Purpose System MK III
Budget Activity: 4 - Tactical Programs

(6) Navigation Accuracy	Accuracy (Nautical Miles)	
Distance from ship		
35 nautical miles	[ ]	[ ] (c-2)
70 nautical miles		(c-2)
100 nautical miles		(c-2)
(b) Availability, Reliability and Maintainability		
(1) Operational Availability		
Total System (%)	76	
Anti-Submarine Warfare (%)	77.8	
Secondary Missions (%)	78.9	
Downtime rate (hour/flight hours)	2.90	
(2) Reliability		
Anti-Submarine Warfare		
Probability of Success (%)	88	87 (o)
Mean Time Between Critical Failure (Hours)	30	
Anti-Ship Surveillance and Targeting		
Probability of Success (%)	85	
Mean Time Between Critical Failure (Hours)	30	
Mean Flight Hours Between Failures	5.4	7.0 (m, d)
SH-60B Non-Avionics (Hours)	3	2.9 (m, d)
Ship Electronics (Hours)	79	99 (m)
(3) Maintainability (Organizational Level Unscheduled)		
Mean Time to Repair		
SH-60B Non-Avionics (Hours)	1.6	1.8 (m)
SH-60B Avionics (Hours)	.9	.95 (m)
Ship Electronics (Hours)	2.25	2.1 (o, d)

Program Element: 64212N
Title: Light Airborne Multi-Purpose System MK III
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

Direct Maintenance Manhours/Flight Hour		
SH-60B Non-Avionics (Hours)	4.0	1.64 (m)
SH-60B Avionics (Hours)	.58	.52 (m)
Direct Unscheduled Maintenance Manhours/Operating Hour		
Ship Electronics (Hours)	.16	.03 (m)
Probability of Automatic Fault Detection		
SH-60B Avionics (%)	90	93 (c-3)
Ship Electronics (%)	80	99 (c-3)
Probability of Automatic Fault Isolation		
SH-60B Avionics (to one module) (%)	85	85 (c-3)
Ship Electronics (to three modules) (%)	80	82 (c-3)

* Demonstrated Legend

(o) OT-IIA Quick Look Message
(m) Mission Profile Qualification Tests
(d) Navy Development Test-Results (Navy Preliminary Evaluations or special tests)
(c) Contract results
- 1 Weapon System Demonstration
- 2 At Sea Technical Evaluation
- 3 Maintainability Demonstration

NOTE: Navy testing toward the objectives will continue through Technical Evaluation, Operational Evaluation, and Follow-on Test and Evaluation.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64213N
Title: Helicopter Development
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,932	10,057	26,560	11,568	24,545	89,118
W0901	Helo Night Vision System (HNVS)	4,729	8,272	16,298	4,819	21,100	66,535
	Quantity: Night Vision Goggles (Aviation)	(T&E)					(3)
	Infrared Detecting Sets			(T&E)			(4)
	Flir Augmented Cobra TOW Sight			(T&E)			(2)
W1502	H-46 Ground Proximity Warning System	203	1,785	292	0	0	2,280
	Quantity: Trial Kits						(2)
W1378	AH-1 Hellfire (Retrofit)	0	0	9,970	6,749	3,445	20,164

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Helicopter Night Vision System (HVNS), W0901, is to be used by AH-1 attack, UH-1 support and CH-46/CH-53 transport helicopters engaged in amphibious assault and combat-support missions. Present Marine helicopter capability to perform amphibious warfare tactical operations in a high threat environment is severely restricted by the lack of a night vision capability. This project will allow attack and transport helicopters to operate at low altitude and near daylight speeds at night and during periods of reduced visibility. Installation of a Ground Proximity Warning System (W1502) in the H-46 aircraft will provide an advanced warning system to the pilot to detect hazardous flight conditions relative to the terrain/water. This project will also produce an emergency flotation system to enable the CH-46 to remain upright upon water entry for 3 hours in conditions up to sea state 5. The AH-1 Hellfire (Retrofit), W1378, will provide the capability to defeat all current and postulated armor threats at increased standoff ranges with less risk to the launch platform using both autonomous and remote laser designators.

(U) BASIS FOR FY 1983 RDT&E REQUEST: H-1 HELICOPTER PROGRAM - Contractor and Navy testing of the H-1 Cockpit Missile Control System will be completed. Operational evaluation will commence. Navy participation in the Army Forward Looking Infra-Red Cobra Tow Sight (FACTS) program will continue. TRANSPORT HELICOPTER PROGRAM - Infrared detecting set engineering development models will be procured and integrated into the CH-53E. Contractor testing will commence. GROUND PROXIMITY WARNING System will fabricate and install prototype flotation kit and conduct contractor testing. The increase in this element from FY 1982 to FY 1983 is due to a significant increase in the development and integration effort of an infrared detecting set in the CH-53E and the procurement of infrared prototypes and required mission equipment. The AH-1 Hellfire (Retrofit) effort has also been added under Project W1378. AH-1 Hellfire (Retrofit) integration and contractor/Navy testing in the AH-1J will be completed. Integration for

the more complex AH-1T will be conducted throughout FY 1983. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are an increase of $383 in FY 1981 as a result of Navy reprogramming and provision for the H-46 Ground Proximity Warning System, a reduction of $360 in FY 1982 as a result of Navy reprogramming and in FY 1983 an increase of $6,621 resulting from a reduction of $3,340 in the Helo Night Vision System program and a $9,970 increase to provide for AH-1 Hellfire (Retrofit). The Total Estimated Cost for W0901 decreased by $15,794 due to restructuring of the Helo Night Vision System program.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,129	4,549	10,417	19,939	38,580	84,439
W0901	Helo Night Vision System	6,129	4,549	8,608	19,638	38,580	82,329
	Quantity: Night Vision Goggles (Aviation)		(T&E)				(3)
	Infrared Detection Systems				(T&E)		(8)
	Flir Augmented Cobra Tow Sight		(T&E)				(2)
W1502	H-46 Ground Proximity Warning System	0	0	1,809	301	0	2,110
	Quantity: Trial Kits						(2)

(U) OTHER APPROPRIATIONS FUNDS: To be determined.

Program Element: 64213N
Title: Helicopter Development
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Marine helicopter capability to perform tactical operations in a high threat environment is restricted by the lack of a night reduced visibility capability. The Helicopter Night Vision System is required for both attack and transport helicopters to enable the aircrews to maneuver, navigate, locate, and land in landing zones at night and during periods of reduced visibility. Additional capability for attack helicopters to gather combat intelligence and to acquire and successfully engage targets will be provided. This project will select appropriate vision subsystem components developed for other applications, combine them in Weapons Replaceable Assemblies, and integrate that system into Marine helicopters.

(U) RELATED ACTIVITIES: The Army has developed Aviation Night Vision Goggles (AVS-6) under P.E. 64710A; DoD Common Module Forward-Looking-Infrared, P.E. 63710A, developed the leading technology employed in night vision systems; Army Advanced Helicopter Program, Army P.E. 64207A, provided significant data on night helicopter flying with infra-red imaging and one candidate option for Marine helicopter night vision. Army Forward Looking Infrared Augmented Cobra TOW Sight (FACTS) and U.S. Coast Guard Short Range Recovery Helicopter Forward-Looking-Infrared are also related.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, Pa; Naval Air Test Center, Patuxent River, Md. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Since program initiation in 1978 numerous sensors for night vision have been evaluated for applicability to the assault mission. Night Vision Goggles for all Marine helicopters and Infrared Detection Sets for the AH-1T and CH-53E have been selected for use in the Helicopter Night Vision System. Night vision testing by other services and other governmental agencies has established the requirement for cockpit lighting modifications for compatibility with the goggles. In cooperation with the Army, the Forward Looking Infrared Augmented Cobra TOW Sight development program is currently undergoing flight testing. The transport helicopter night vision system simulation program has been completed. A modified Infrared Detection Set (AN/AAS-36) was procured and is being flight tested in a CH-53A to determine final configuration required for the mission. Studies were initiated to ascertain aircraft lighting modifications necessary for compatibility with night vision goggles.

2. (U) FY 1982 Program: During the first quarter technical and operational tests will be conducted for the Night Vision Goggle and Cockpit Lighting modifications for the CH-46 and CH-53. The remainder of the FY: Completion of AH/UH-1 Lighting Mods, procurement of Night Vision Goggles, H-1 Cockpit Missile Control System Design and Integration, and preparation of system specification for the infrared detecting set and mission element. Also, a contract for an infrared detecting set prototype will be awarded, two tow missile sight units will be provided to the Army's Forward Looking Infrared Augmented Cobra Tow Sight contractor for assembly and tests. Ground Promixity Warning System will define interface requirements of warning device and complete design of prototype floats for emergency flotation.

Element: 64213N
sion Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: Helicopter Development
Budget Activity: 4 - Tactical Programs

FY 1983 Planned Program: H-1 Cockpit Missile Control System prototype will be delivered and contractor and Navy testing completed. Infrared detecting set prototype will be delivered and integration begun in the CH-53E. Navy will participate Army's Forward Looking Infrared Augmented Cobra Tow Sight system testing. AH-1 Hellfire (Retrofit) integration and tor/Navy testing in the AH-1J will be completed. Integration for the more complex AH-1T will be conducted throughout FY Ground Proximity Warning System prototype will be interfaced with aircraft and emergency flotation fabrication and tor testing will be done.

FY 1984 Planned Program: Developmental testing of the Forward Looking Infrared Augmented Cobra TOW Sight will be ied. Complete integration of Infrared Detecting Set prototype in CH-53E. Commence Operational Evaluation of the H-1 Cockpit Control System, production contract will be awarded for Hellfire Systems for the AH-1J. AH-1T integration effort and tor testing will be completed by mid-year, followed by commencement of Navy testing.

Program to Completion: FY 1985: Complete operational test of the H-1 Cockpit Missile Control System and award production t. Conduct operational test of Forward Looking Infrared Augmented Cobra TOW Sight and award production contract. Conduct echnical testing and commence operational evaluation of the Infrared Detecting Set. Complete Navy testing of the AH-1T e (Retrofit) and award production contract. FY 1986: Complete operational evaluation and award production contract for rared Detecting Set.

Milestones: Not applicable.

Project: W0901 — Title: Helicopter Night Vision System (HNVS)
Program Element: 64213N — Title: Helicopter Development
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Marine helicopter capability to perform tactical operations in a high threat environment is restricted by the lack of a night reduced visibility capability. The Helicopter Night Vision System is required for both attack and transport helicopters to enable the aircrews to maneuver, navigate, locate, and land in landing zones at night and during periods of reduced visibility. Additional capability for attack helicopters to gather combat intelligence and to acquire and successfully engage targets will be provided. This project will select appropriate vision subsystem components developed for other applications, combine them in Weapons Replaceable Assemblies and integrate that system into Marine helicopters.

(U) RELATED ACTIVITIES: The Army has developed Aviation Night Vision Goggles (AVS-6) under PE 64710A. DoD Common Module Forward-Looking-Infrared, PE 63710A, developed the leading technology employed in night vision systems; Army Advanced Helicopter Program, PE 64207A, provided significant data on night helicopter flying with infra-red imaging and one candidate option for Marine Helicopter night vision. Army Forward Looking Infrared Augmented Cobra TOW Sight (FACTS) and U. S. Coast Guard Short Range Recovery Helicopter Forward Looking Infrared are also related.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, Pa.; Naval Air Test Center, Patuxent River, Md. Contractor: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Since program initiation in 1978 numerous sensors for night vision have been evaluated for applicability to the assault mission. Night Vision Goggles for all Marine helicopters and Infrared Detection Sets for the AH-1T and CH-53E have been selected for use in the Helicopter Night Vision System. Night vision testing by other services and governmental agencies has established the requirement for cockpit lighting modifications for compatibility with the goggles. In cooperation with the Army, the Forward Looking Infrared Augmented Cobra TOW sight development program is currently undergoing flight testing. The transport helicopter night vision system simulation program has been completed. A modified Infrared Detection Set (AN/AAS-36) was procured and is being flight tested in a CH-53 to determine final configuration required for the mission. Studies were initiated to ascertain aircraft lighting modifications necessary for compatibility with night vision goggles.

2. (U) FY 1982 Program: During the first quarter technical and operational tests will be conducted for the night vision goggle and cockpit lighting modifications for the CH-46 and CH-53. The remainder of the FY: completion of AH/UH-1 lighting mods, procurement of night vision goggles, H-1 Cockpit Missile Control System design and integration, and system specification for the Infrared Detecting Set and mission equipment. Also, a contract for an Infrared Detecting Set prototype will be awarded, and two TOW missile sight units will be provided to the Army's Forward Looking Infrared Augmented Cobra Tow Sight contractor for assembly and tests.

Project: W0901 Title: Helicopter Night Vision System (HNVS)
Program Element: 64213N Title: Helicopter Development
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: H-1 Cockpit Missile Control System prototype will be delivered and contractor and Navy testing will be completed. Infrared Detecting Set prototype will be delivered and integration begun in the CH-53E. Navy will participate in the Army's Forward Looking Infrared Augmented Cobra TOW Sight system testing. AH-1 Hellfire (retrofit) integration and contractor/Navy testing in the AH-1J will be completed. Integration for the more complex AH-1T will be conducted throughout FY 1983.

4. (U) FY 1984 Planned Program: Developmental testing of the Forward Looking Infrared Augmented Cobra TOW Sight will be continued. Complete integration of Infrared Detecting Set prototype in CH-53E. Commence Operational Evaluation of H-1 Cockpit Missile Control System. Production contract will be awarded for Hellfire systems for the AH-1J. AH-1T integration effort and contractor testing will be completed by mid year, followed by commencement of Navy testing.

5. (U) Program to Completion: FY 1985: Complete operational test of the H-1 Cockpit Missile Control System and award production contract. Conduct operational test of Forward Looking Infrared Augmented Cobra Tow Sight and award production contract. Conduct Navy technical testing and commence operational evaluation of the Infrared Detecting Set. Complete Navy testing of the AH-1T Hellfire retrofit and award production contract. FY 1986: Complete operational evaluation and award production contract for the Infrared Detecting Set.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0901	Helo Night Vision System (HNVS)	4,729	8,272	16,298	4,819	21,100	66,535

Project: W1378 Title: AH-1 Hellfire (Retrofit)
Program Element: 64213N Title: Helicopter Development
Dod Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Marine attack helicopters lack the required anti-armor weapon system to fully combat modern tank armor. The AH-1J helicopter does not have an air-to-ground missile system. The AH-1T helicopter does have the TOW missile system; however, the TOW missile is unable to penetrate modern tank armor. Further employment of the TOW missile from the AH-1T requires continuous exposure of the helicopter to counterfire throughout the duration of the attack because line of sight contact with the missile and the target is required. This project will solve this operational shortfall by integrating the Army developed Hellfire missile system into both the AH-1J and AH-1T helicopters.

(U) RELATED ACTIVITIES: The Army has successfully developed and proven the operational capabilities of the Hellfire missile system in conjunction with the AH-64A helicopter program. The Hellfire anti-tank missile overcomes the current operational shortfall. Hellfire speed and shaped-charge warhead is designed for use against modern armor. Also, it can be fired in defilade, thus avoiding exposure to counterfire, or in a direct fire mode where line of sight with the target is required only for acquisition and firing. The Army has conducted in excess of 40 test firings from both AH-1G and AH-64 helicopters using both ground and airborne laser designators with better than a 90% success rate of hitting the target.

(U) WORK PERFORMED BY: In-house: Naval Air Test Center, Patuxent River, Md.; Naval Air Engineering Center, Lakehurst, N.J.; Pacific Missile Test Center, Pt. Mugu, Ca.; Naval Weapons Center, China Lake, Ca. Contractors: Bell Helicopter Textron, Ft. Worth, Tx.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: During FY 1981 a feasibility demonstration was participated in by the Marines using Army AH-1G and AH-64 helicopters. These programs amplified the Marine Corps' need for the operational capability exhibited by the Hellfire missile and proved the feasibility of the missile operating from attack helicopters in a tactical environment.

2. (U) FY 1982 Program: An integration effort will be started with initial study efforts for the AH-1J and AH-1T. The AH-1J effort will be structured toward an austere installation using Army developed Hellfire missile equipment with minimum changes to the aircraft and missile hardware. The AH-1J installation will start the prototype phase in the fourth quarter of FY 1982. The AH-1T installation is more complex due to requirement for interface with the TOW missile system and integration with the cockpit missile control functions. A longer, more detailed study effort will be required and one mock-up will be evaluated during FY 1982 before the prototype is assembled.

3. (U) FY 1983 Planned Program: The AH-1J integration will be completed in FY 1983. Contractor testing, Navy testing and documentation for approval for service use will be completed. The AH-1T integration will complete the mock-up phase and the prototype installation will be started.

Project: W1378 Title: AH-1 Hellfire (Retrofit)
Program Element: 64213N Title: Helicopter Development
Dod Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Approval for service use will be obtained by the third quarter FY 1984 with a production contract projected for May 1984. The AH-1T will complete the prototype phase, complete contractor test and start Navy technical evaluation.

5. (U) Program-to Completion: FY 1985: the AH-1T will complete Navy test. Approval for Service Use is planned for third quarter 1985 with a production contract projected for May 1985. The AH-1J production effort will be complete and a limited Operational Test-IV/V conducted. FY 1986: The AH-1T production effort will be complete and a limited Operational Test-IV/V conducted.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1378	AH-1 Hellfire (Retrofit)	0	0	9,970	6,749	3,445	20,164

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64214N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: AV-8B (Engineering)
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	236,371	226,413	114,071	67,133	17,718	964,761
WO652	AV-8B	236,371	226,413	114,071	67,133	17,718	964,761
	Quantity (Operational Test and Evaluation)	OT&E					(4)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The AV-8B will meet the Marine Corps requirement 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 the PEGASUS II engine that has twice the range or payload of the current HARRIER. 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.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development testing including airframe static, fatigue and flight testing. Initiate Board of Inspection and Survey and Operational Test and Evaluation. Begin limited production. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: FY 1981 decreased $4,329. The $243,000 added by Congressional action in FY 1981 was reduced by $6,629; $2,300 due to Navy application of the Congressional general reductions for inflation and travel, $2,429 due to other inflation, economics and travel Reductions and $1,900 due to Navy reprogramming action. FY 1982 decreased $4,327 due to inflation, economics and travel reductions. FY 1983 increased $16,088 and the total program increased $44,300 to accommodate an unfavorable U.S. dollar/British Pound ratio, cost growth on the development engines and increases in scope of the program.

Program Element: 64214N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: AV-8B (Engineering)
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	180,291	240,700	230,740	97,983	47,983	920,461
W0652	AV-8B	180,291	240,700	230,740	97,983	47,983	920,461

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN-1 (26110M)	88,700	613,100	751,100	882,100	7,128,800	9,463,800
Quantity	(Adv. Procurement) 12	18	30	276	336	
Milcon (26496M)	0	0	2,550	0	0	2,550

Program Element: 64214N
Title: AV-8B (Engineering)
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The success of the AV-8A aircraft in providing the Vertical/Short Take-Off and Landing requirements of the United States Marine Corps led to the requirement for an improved aircraft capable of increased payload and range over the AV-8A. In cooperation with the manufacturers of the AV-8A, Hawker Siddeley Aviation Ltd., and the United Kingdom Government, the U. S. Navy conducted studies of such an improved aircraft, designated the AV-16. This new aircraft design incorporated a new engine, substantially redesigned wings and fuselage, and advanced avionics. Because of the cost of the AV-16 program, however, no effort was initiated beyond the study phase, which was completed in FY 1974. The U. S. Licensee of Hawker Siddeley Aviation Ltd., McDonnell Douglas Aircraft Corp., then examined potential improvements in the existing AV-8A in laboratory and flight tests. By utilizing the existing AV-8A engine, incorporating a new wing, and redesigning certain aerodynamic characteristics of the aircraft, it was discovered that the AV-8A could be greatly improved and could possibly meet or exceed the projected performance of the proposed AV-16 at a much lower cost. These aerodynamic changes and modified wing have since been tested in the full scale wind tunnel confirming theoretical estimates. The new aircraft, designated the AV-8B, is required by the U. S. Marine Corps to fulfill their responsibility in providing Close Air Support for amphibious operations or for operations ashore. The use of Vertical/Short Take-off and Landing aircraft with their basing flexibility is seen as the most effective method of meeting this responsibility. The AV-8B will be substantially manufactured by McDonnell Douglas Corporation in St. Louis, MO, with manufacture of certain portions of the fuselage being done by Hawker Siddeley Aviation Ltd., renamed British Aerospace Ltd., in Great Britain. The engine will be manufactured by Rolls Royce Ltd., the current engine manufacturer, with certain engine parts manufactured by Pratt Whitney Corporation. The flight demonstration effort was performed by two AV-8A modified to YAV-8B.

(U) RELATED ACTIVITIES: Previous study efforts on the new wing were conducted by the Navy for the AV-16 with FY 1973 and FY 1974 RDT&E,N funds. Concept formulation and advanced development were performed under PE 63211N. The new wing is constructed of composite materials.

(U) WORK PERFORMED BY: In-House: Naval Air Test Center, Patuxent River, MD; Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminister, PA. Contractors: McDonnell Douglas Corporation, St. Louis, MO, with subcontract to British Aerospace Ltd., Kingston, England.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Defense Systems Acquisition Review Council I was held in March 1976. Concept studies led to Advanced Development plan for AV-8B prototype. Two existing AV-8A aircraft were taken from the inventory and were modified with new wing and other aerodynamic changes selected for the AV-8B design. An extensive wind tunnel test program was completed during FY 1977. Fabrication of the composite wing and definition of the aircraft and engine interface was completed on schedule. The first flight of the YAV-8B occurred in November 1978. Two prototypes were initially in the test program. Development

Program Element: 64214N
Title: AV-8B (Engineering)
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

specifications were generated for subsystems, reliability and maintainability, and logistics, and life cycle cost parameters were established. The PEGASUS 11 engine was modified to incorporate a new front nozzle and gear box, and the Preliminary Flight Rating Test was conducted successfully. Selection of avionics, armament, and cockpit design was begun. Wing structural and fatigue tests for flight clearance were conducted successfully. Navy Preliminary Evaluations I and II were successfully completed and validated the aerodynamic performance of the wing and the Lift Improvement Devices. The Initial Operational Test and Evaluation was completed on the YAV-8B. Full Scale Development was initiated in 1979 to construct four pre-production AV-8B aircraft. Effective 23 August 1981, the United States Government and the United Kingdom Government entered into a Memorandum of Understanding which defines the arrangements between the governments by which they collaborate in development, production and support of the AV-8B. Approximately 60 to 100 aircraft, to be designated the GR Mk. 5 will be produced by British Aerospace.

2. (U) FY 1982 Program: Four Full Scale Development aircraft will be completed for test and evaluation. The first flight took place on 5 November 1981 at the McDonnell Douglas, St. Louis facility. The four aircraft will be transferred to the Naval Air Test Center, Patuxent River for flight testing upon acceptance. Begin pilot production.

3. (U) FY 1983 Planned Program: Begin limited production and award full production advance procurement contract. Continue airframe static, fatigue and flight development testing. Initiate Board of Inspection and Survey Trials.

4. (U) FY 1984 Planned Program: Complete Board of Inspection and Survey. Initiate and complete Operational Test and Evaluation and obtain Approval for Service Use. Definitize full production contract.

5. (U) Program to Completion: Analyze all test results and correct any deficiencies resulting from Board of Inspection and Survey and Operational Test and Evaluation.

6. (U) Milestones:

	Milestones		Date
a.	Defense System Acquisition Review Council I		March 1976
b.	YAV-8B first flight		November 1978
c.	Defense Systems Acquisition Review Council II		July 1979
d.	Detail Design Review		July 1980
e.	Award of Full Scale Development Contract		August 1980
f.	First Flight of AV-8B (Full Scale Development)	*(October 1981)	November 1981
g.	Award of Production Contract		April 1982
h.	Board of Inspection and Survey		October 1983
i.	Operational Test and Evaluation		January 1984
j.	Initial Operational Capability		June 1985

* Date in parenthesis shown in FY 1982 Descriptive Summary. Change resulted from minor program adjustments.

Program Element: 64214N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: AV-8B (Engineering)
Budget Activity: 4 - Tactical Programs

TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: (a) The AV-8B Test Program will evaluate and assess the technical and operational characteristics through an integrated and extensive development (contractor and Navy) and operational test and evaluation effort. The test program supports the acquisition strategy of the AV-8B by providing test results related to the established thresholds of characteristics in support of major milestones. (b) The basic aerodynamic improvements of the AV-8B (supercritical high-lift composite wing, engine inlet modification and lift improvement devices) over the current operational AV-8A have been demonstrated in a contractor/Navy flight test program at the Naval Air Test Center, Patuxent River, Md., with the two AV-8A aircraft converted to prototype YAV-8Bs. Performance characteristics for maximum Vertical Takeoff weight, Short Takeoff weight at 27,950 lbs, sustained "g" and cruise performance (clean loaded) have been demonstrated in support of the Milestone II full-scale development decision. The Test and Evaluation Master Plan addressing the detail tests of the AV-8B full scale development phase has been prepared. (c) The full-scale development test program will utilize the results of the demonstration validation phase to the maximum extent possible to minimize unnecessary duplication. The full scale development test program will focus on the new features added over those in the AV-8A and YAV-8B. The laboratory and ground tests will include over 2000 hours of wind tunnel testing, complete static, drop and fatigue structural qualification, manned flight simulation and overall avionics functional and integration tests including a crew station cockpit mock-up. The full scale development flight test will use five aircraft (one YAV-8 and four AV-8B) for the development and initial operational test and evaluation and consist of over 90 aircraft test months. Four distinct periods of Navy Preliminary Evaluations/Initial Operational Test and Evaluation are interspaced during the test program. Shipboard sea trial tests will be conducted during Board of Inspection and Survey trials. Reliability and maintainability goals and thresholds as defined in the test plan will be monitored throughout development. Completed technical testing supporting the Limited Production Decision in November 1982 includes the following: wing and fuselage static loads, wind tunnel, canopy/ejection, system integration (hardware/software), fatigue loads (2 lifetimes), and approximately 35 aircraft flight test months including 3 aircraft months of Navy testing. Complete development in support of the Milestone III full production decision will include all the contractor major ground and flight demonstration tests and all Navy testing and trials to include 25mm gun system integration tests. Naval Air Test Center will be the principal test site for contractor and Navy.

2. (U) Operational Test and Evaluation: (a) Operational Testing is being conducted under the auspices of Commander Operational Test and Evaluation Force. The AV-8B program has completed demonstration and validation phase and proceeded into full scale development with the production of four full scale development AV-8B aircraft. (b) Defense System Acquisition Review Council I (March 1976) directed the accomplishment of a Flight Demonstration Program to validate the proposed technological aspects of the AV-8B. Two AV-8A aircraft were modified to prototype YAV-8B's and the flight development program was conducted as combined Development Test/Operational Test I at Naval Air Test Center, Patuxent River, MD. The prototype YAV-8B is aerodynamically

Program Element: 64214N **Title:** AV-8B (Engineering)
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare **Budget Activity:** 4 - Tactical Programs

representative of the AV-8B but does not contain all planned avionics or system modifications. When flight performance and handling qualities in the attack mission profile and Vertical/Short Take-off and Landing environments were assessed and compared to the AV-8A, the YAV-8B was found to be potentially operationally effective. Assessment of contractor maintenance plus reliability and maintainability data indicated the YAV-8B was potentially operationally suitable. Reliability and maintainability thresholds were not set. Analysis of contractor collected data showed a Mean Flight Hour Between Failure rate of 3.0 and 3.2 hours in Navy Preliminary Evaluation 1 and 2, respectively, as compared to the AV-8A rate of 1.5 hours. (c) Operational Test I, completed in July 1979, consisted of Air Test and Evaluation Squadron FIVE, Commander, Operational Test and Evaluation's test agent, monitoring contractor and Navy testing plus active participation via three flights during Navy Preliminary Evaluation. (d) Further Initial Operational Test and Evaluation in the Engineering Development Phase will utilize two Full Scale Development aircraft with full production systems for approximately 30 test days during Operational Test IIB (August - September 1982) to assess AV-8B capabilities in close air-support and interdiction roles. Operational level aircraft servicing will be provided by AV-8A experienced Marine Corps personnel. Operational/Intermediate level maintenance and logistic support will be contractor furnished during Operational Test IIB and fleet respresentative personnel during Operational Test IIC. (e) Initial Operational Test and Evaluation will culminate in the Operational Evaluation by Air Test and Evaluation Squadron FIVE during Operational Test IIC (October 1983 - January 1984) at China Lake, CA to support the Milestone III production decision. Six aircraft months (2 production representative full scale development aircraft for 3 months) of testing in full operational scenarios, including operations from ships, will involve dedicated Marine Corps Operational level support. Peculiar Ground Support Equipment and Automatic Test Equipment will be evaluated, if available. Equipment not available will be tested during Operational Test III. (f) Follow-on Operational Test and Evaluation will be conducted at Naval Weapons Center, China Lake, CA and Marine Corps Air Station, Yuma, AZ by Air Test and Evaluation Squadron FIVE and Marine Attack Squadron 513 respectively. Follow-on Test and Evaluation will be monitored by Commander, Operational Test and Evaluation Force and Marine Corps Operational Test and Evaluation Agency and will verify corrective action recommended during Initial Operational Test and Evaluation, develop tactics, test equipment and/or systems not available during Initial Operational Test and Evaluation, and evaluate the AV-8B Operational Flight Program software operational effectiveness. Reliability, availability and maintainability thresholds and goals are as follows:

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Program Element: 64214N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: AV-8B (Engineering)
Budget Activity: 4 - Tactical Programs

	Thresholds		
	Operational Test IIB	Operational Test IIC	Goal 1/ Mature System
1. Direct Maintenance Manhour/Flight hour	TBD 2/	18.0	14.5 hours
2. Mission Capable Rate 1/	50%	70%	85%
3. Elapsed Manhours/Maintenance Action	4.0	2.5	1.9 hours
4. Mission Reliability	70%	80%	93%

1/ Mission Capable Rate - once declared ready for flight, probability that aircraft will launch and successfully complete assigned mission with no failure of the mission essential equipment. The rate will be computed with the Navy 3M system for the AV-8B's primary mission.
2/ Mean Time to Repair; as defined in OPNAVINST 4970.2B.

3. (U) Systems Characteristics:

Objectives

a. Maximum Vertical Takeoff Weight - 19,185 lbs.
b. Short Take-off distance with 28,350 lbs - 1000 ft.
c. Close Air Support Mission Radius - 225 nautical miles (7MK82SE, Guns and Ammo - Short takeoff)
d. Reliability: Mean Flight Hour Between Failure at Milestone III - 1.8 hours
e. Maintainability: Direct Maintenance Manhours per Flight Hour at Milestone III - 18.0 hours

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64215N
DoD Mission Area: 235 - Naval Warfare Support

Title: Support Equipment
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,903	6,947	8,700	8,837	Continuing	Continuing
W0601	Aircraft Handling & Servicing Equipment	3,639	4,193	5,033	5,375	Continuing	Continuing
W0852	Aviation Automatic Test Equipment	1,181	2,364	2,814	3,007	Continuing	Continuing
W1108	Aircraft Salvage & Handling Equipment	2,083	390	853	455	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Aircraft Handling and Servicing Equipment, Aviation Automatic Test Equipment, and Aircraft Salvage and Handling Equipment projects provide for full scale development of Naval aviation support equipment systems. These systems are required for operational and maintenance support for all aircraft, propulsion, avionics, and armament systems at all maintenance levels (organizational, intermediate, and depot).

(U) BASIS FOR FY 1983 RDT&E REQUEST: Several ongoing subprojects under the Aircraft Handling and Servicing Equipment, Aircraft Salvage and Handling Equipment and Aviation Automatic Test Equipment projects will be in various stages of development and testing. Continued funding in FY 1983 is required to successfully complete these tasks and prepare for production release. The increase in funds from FY 1982 to FY 1983 is due to increased development effort on the Aircraft Salvage and Handling Equipment Crane. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are reductions of 58 in FY 1981, 99 in FY 1982, and 271 in FY 1983 as a result of a general reduction for inflation, Navy program restructuring and refinement of cost estimates.

Program Element: 64215N
DoD Mission Area: 235 - Naval Warfare Support

Title: Support Equipment
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,396	6,961	7,046	8,971	Continuing	Continuing
W0601	Aircraft Handling & Servicing Equipment	3,820	3,639	4,254	5,184	Continuing	Continuing
W0852	Aviation Automatic Test Equipment	1,259	1,239	2,397	2,911	Continuing	Continuing
W1108	Aircraft Salvage and Handling Equipment	317	2,083	395	876	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN (Various equipments as developed)	85,678	103,910	185,740	146,418	Continuing	Continuing

lement: 64215N
on Area: 235 - Naval Warfare Support

Title: Support Equipment
Budget Activity: 4 - Tactical Programs

AILED BACKGROUND AND DESCRIPTION: Aviation support equipment is an essential logistic element which must be provided for ition operations. All aircraft and airborne weapons systems necessarily require a variety of ground support equipment. uirement is significantly more complex in the shipboard environment than at the shorebased stations and involves the full concepts, equipment, and systems necessary for ground testing, servicing, handling, and maintenance of Naval and Marine rcraft and aircraft systems, ashore and afloat. The general objective of this project is to develop advanced aviation systems and equipment to meet these operational needs. There are several individual development tasks (sub-projects) re directed toward engineering development and testing/evaluation of support equipment which provide optimal increases in on, standardization, reliability, and maintainability, as well as responding to newly identified operational and ace requirements. These sub-projects are initiated in response to a variety of operational needs, as identified by nal analyses, maintenance plans, logistic support analyses, and other sources, such as monitoring Fleet feedback.

TED ACTIVITIES: None.

PERFORMED BY: In-House: Lead Field Activity is the Naval Air Engineering Center, Lakehurst, NJ; Naval Air Development Warminster, PA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Air Test Center, Patuxent River, MD; Naval Avionics , Indianapolis, IN; Naval Surface Weapons Center, Dahlgren, VA. Contractors: Northern Research Corp., Woburn, MA; Page Inc., Atchison, KA; Consolidated Diesel Corp., Old Greenwich, CT; Dayton T. Brown, Inc., Bohemia, NY; Standard Mfg Co., TX; Entwistle Co., Hudson, MA; Coastal Marine Research, Toms River, NJ; Stewart & Stevenson Inc., Houston, TX.

RAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

FY 1981 and Prior Accomplishments: This Program was initiated in FY 1971. There are several sub-projects/task areas in stages of development. Sub-projects completed (Full Scale Development, Test and Evaluation successfully completed): Self-Propelled Twin Agent Firefighting Vehicle for Carrier Operations; Universal Bomb/Missile Assembly Station sed); Variable Geometry Air Dynamometer for Turbo-Shaft Engines; Semi-Automatic "Fail Safe" Tire Inflation Unit for Tires; Aircraft Tire Flaw Detector Unit; Sonic/Eddy Current Inspection Unit for Aircraft Components; Aircraft Flight-Line Distribution System; Munitions Handling Set; Aircraft Fueling System Coalescer/ Filter Non-Destructive Testing Unit; Jet Fuel Controls Automatic Test System; Missile Transporter (Shore-based); Bomb Sling; Prime Mover for Armament Handling t (Shore-based); Parachute Thermo Vacuum Dryer for Expeditionary Operations; Single Hoist Ordnance Loading System Adapters ol Aircraft; Large Missile Handling Adapter; Multi-purpose Sonic Energy Cleaner; Modular Cryogenerator; Eddy Current Test rboshaft Engine Test System; Multi-Purpose Aircraft Maintenance Hoist; Small Munitions Trailer (Shorebased); Engine Test alyzer (Real Time); Hydraulic Fluid Dehydration System; Turbofan Engine Test Cell Modernization; Turboprop Engine Test ; Aircraft Weapon Loader and Engine Test Stand Data Acquisition System. Sub-projects initiated: Gaseous Nitrogen r; Eddy Current Probes.

Program Element: 64215N
DoD Mission Area: 235 - Naval Warfare Support

Title: Support Equipment
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Complete Sub-projects: Aircraft Weapon Hoist; Aircraft Hydraulic Component Test Stand (100 GPM); Armament Handling Equipment Test Stand; Marine Corps Hoist System; Small Missile Adapter; Jet Aircraft Ground Start Unit; Small Aircraft Handler; Propulsion Automatic Test Equipment Diagnostic Programming. Continuing Sub-projects: Aircraft Spotting Vehicle; Mobile Electric Power Plant; Digital Automatic Test Program Generator; Aircraft Salvage and Handling Equipment Crane; Crash Dolly and Padding Assemblies; Weapons Skid; Shipboard Weapons Loader; Mobile Turbofan/Jet Engine Test System; Shipboard Radiographic Film Processor; Aircraft Tow Tractor; Avionics Consolidated Support System; Gaseous Nitrogen Generator; Eddy Current Probes. Initiate sub-projects: Composite Bond Tester; Portable Magnetic Particle Unit; Ultrasonic Particle Counter.

3. (U) FY 1983 Planned Program: Complete Sub-projects: Weapons Skid; Shipboard Radiographic Film Processor; Eddy Current Probes; Gaseous Nitrogen Generator; Mobile Turbofan/Jet Engine Test System; Digital Automatic Test Program Generator. Continue Sub-projects: Avionics Consolidated Support System; Aircraft Salvage and Handling Equipment Crane; Shipboard Weapons Loader; Aircraft Spotting Vehicle; Mobile Electric Power Plant; Aircraft Tow Tractor; Composite Bond Tester; Portable Magnetic Particle Unit; Initiate sub-projects: Liquid Oxygen Generator; Generator Test Stand; Aircraft Engine Temperature System Test Set; Dynamic Engine Simulator; Bomb Trailer; Advance Base Weapons Loader Chemical Tank Filling Unit.

4. (U) FY 1984 Planned Program: Complete Sub-projects: Shipboard Weapons Loader; Composite Bond Tester. Continue Sub-projects: Aircraft Salvage and Handling Equipment Crane; Generator Test Stand; Aircraft Spotting Vehicle; Aircraft Tow Tractor; Dynamic Engine Simulator; Liquid Oxygen Generator; Mobile Electric Power Plant; Aircraft Engine Temperature System Test Set; Bomb Trailer; Advance Base Weapons Loader; Chemical Tank Filling Unit; Avionics Consolidated Support System; Portable Magnetic Particle Unit. Initiate sub-projects: None.

5. (U) Program to Completion: This Program Element provides a continuing aviation support equipment full scale development program. Specific Sub-projects/Task Areas are phased into engineering development and, subsequently, into the procurement plan (APN-7) based upon operational needs and the Weapons Systems Planning Data document. All system/equipment which are developed will be tested and evaluated prior to approval for service use. Commercial "off-the-shelf" technology and equipment will be incorporated when practical.

6. (U) Milestones: Not applicable.

Project: W0601 Title: Aircraft Handling and Servicing Equipment
Program Element: 64215N Title: Support Equipment
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Aircraft Handling and Servicing Equipment includes such support equipment items as hydraulic test stands, mobile electric power plants, aircraft ground start units, aircraft tow tractors and aircraft engine test equipment. Also included in this category of support equipment are adapters, trailers, loaders and hoisting mechanisms to load, unload and transport to and from the aircraft the bombs, mines, torpedoes, etc. utilized by Navy/USMC aircraft. The objective of this project is to develop the new or replacement equipment required to meet the operational needs of these aircraft ashore and afloat. Increased standardization, reliability and maintainability will be realized as well as new operational and maintenance requirements being supported.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-House: Lead field activities are the Naval Air Engineering Center, Lakehurst, NJ: Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD and Naval Surface Weapons Center, Dahlgren, VA. Contractors: Northern Research Corp, Woburn, MA; Page Airways Inc., Atchinson, KA; Consolidated Diesel Corp., Old Greenwich, CT; Dayton T. Brown Inc., Bohemia, NY; Standard Mgf. Co., Dallas, TX; Entwistle Co., Hudson, MA; Coastal Marine Research, Toms River, NJ; Stewart & Stevenson Inc., Houston, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This project was initiated in FY 1971. Full scale development has been completed on the following items: Universal Bomb/Missile Assembly Station; Semi-Automatic "Fail Safe" Tire Inflation Unit for aircraft tires; Aircraft Tire Flaw Detector Unit; Sonic/Eddy Current Inspection Unit for aircraft components; Variable Geometry Air Dynamometer for turboshaft engines; Munitions Handling Set; Aircraft Fueling System Coalescer/Filter Non-destructive Testing Unit; Missile Transporter (Shorebased); Bomb Sling; Prime Mover for Armament Handling Equipment (Shorebased); Turboshaft Engine Test System; Parachute Thermo Vacuum Dryer for expeditionary operations; Engine Test Data Acquisition System; Single Hoist Ordnance Loading System Adapters for patrol aircraft; Large Missile Handling Adapter; Multi-purpose Sonic Energy Cleaner; Modular Cryogenerator; Current Test Set; Multi-purpose Aircraft Maintenance Hoist; Small Munitions Trailer (Shorebased). Sub-projects initiated: Gaseous Nitrogen Generator; Eddy Current Probes.

2. (U) FY 1982 Program: Complete sub-projects: Aircraft Weapons Hoist; Aircraft Hydraulic Component Test Stand (100 GPM); Armament Handling Equipment Test Stand; USMC Hoist/Transport System; Small Missile Adapter; Jet Aircraft Start Unit; Small Aircraft Handler (ENMOD). Continue Aero-21D Weapon Skid; Shipboard Weapon Loader; Mobile Electric Power Plant; Shipboard Radiographic Film Processor; Mobile Turbofan/Jet Engine Test System; A/E37T-24 Adapter Assembly (T400); A/S32A-32 Spotting Dolly; TA-10 Tow Tractor; Eddy Current Probes; Gaseous Nitrogen Generator. Initiate Ultrasonic Particle Counter; Composite Bond Tester; Portable Magnetic Particle Unit.

Project: W0601 Title: Aircraft Handling and Servicing Equipment
Program Element: 64215N Title: Support Equipment
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Complete Weapons Skid; Shipboard Radiographic Film Processor; Eddy Current Probes; Gaseous Nitrogen Generator; Mobile Turbofan/Jet Engine Test System. Continue Shipboard Weapons Loader; Aircraft Spotting Vehicle; Mobile Electric Power Plant; Aircraft Tow Tractor; Composite Bond Tester; Portable Magnetic Particle Unit; A/E37T-24 Adapter Assembly (T400 Engine); Initiate Liquid Oxygen Generator; Generator Test Stand; Bomb Trailer; Advance Base Weapons Loader; Chemical Tank Filling Unit; Aircraft Engine Temperature System Test Set; A/E37T-24 Adapter Assembly (T64 Engine); A/W37T-1 Turboshaft Engine Mod; Dynamic Engine Simulator.

4. (U) FY 1984 Planned Program: Complete Shipboard Weapons Loader; Composite Bond Tester; A/E37T-24 Adapter Assembly (T400). Continue Generator Test Stand; Aircraft Spotting Dolly; Aircraft Tow Tractor; Mobile Electric Power Plant; Bomb Trailer; Advance Base Weapons Loader; Chemical Tank Filling Unit; Portable Magnetic Particle Unit; A/E37T-24 Adapter Assembly (T64); A/W37T-1 Turboshaft Engine Mod; Dynamic Engine Simulator; Aircraft Engine Temperature System Test Set; Liquid Oxygen Expeditionary Generator. Initiate A/E37T24 Adapter Assembly (T53).

5. (U) Program to Completion: This project provides a continuing full scale development program for support equipment of the category described in paragraph 1 above. Specific items are phased into engineering development and, subsequently, into the procurement plan (APN-7) based upon operational needs and the Weapons Systems Planning Data Document. All equipment which are developed will be tested and evaluated prior to approval for service use. Commercial "off-the-shelf" technology and equipment will be incorporated when practical.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0601	Aircraft Handling & Servicing Equipment	3,639	4,193	5,033	5,375	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64217N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: S-3 Weapon System Improvement Program
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	14,738	41,702	78,344	55,733	27,194	230,191
W0489	Acoustic Improvements	10,346	27,309	56,132	39,634	17,216	163,117
W1289	Non-Acoustic Improvements	4,392	14,393	20,747	14,712	9,978	64,222
W1639	Communication Control Group	0	0	1,465	1,387	0	2,852
	Quantity (Prototypes)						(4)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The S-3 Weapon System Improvement Program addresses the requirement for an improved outer zone air anti-submarine warfare capability within the broad mission area of battle group anti-submarine warfare. These airborne outer zone tasks include independent screening and contact investigation in coordination with complementary surface, subsurface, and airborne units. The S-3 Weapon System Improvement Program is a modification program designed to improve the mission system effectiveness of the carrier based S-3A to meet current and projected threats. The current program addresses acoustic and non-acoustic improvements (radar, Electronic Support Measures, HARPOON launch, chaff and flare dispensing).

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 budget request provides for continuation of full-scale engineering development at an increased level of effort. During FY 1983, prototype hardware and software development will continue to be accelerated, system integration will be continued, and integrated logistics support elements development will continue. The increase in funding from FY 1982 to FY 1983 is due to the increased level of effort in full scale development. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflect the following factors: The elements of the approved FY 1983 update program are substantially different than that contained in the FY 1982 summary. The configuration of the FY 1983 Acoustic Improvement (W0489) program now includes the Navy's standard AN/UYS-1 Advanced Signal Processor (ASP), Analyzer Unit (AU) and the AN/ARR-78 Advanced Sonobuoy Communication Link. The nomenclature of W1289 has been changed from Radar to Non-acoustics so as to include Electronic Support Measures, Electronic Counter Measures and HARPOON upgrades in addition to the AN/APS-116 Inverse Synthetic Aperture Radar capability. The Milestone IIB program review approved additional funding in FY 1983 and the outyears of 83,752 to fully fund this program as follows: Acoustic upgrades 63,149 and 20,603 for non-acoustic upgrades. The non-acoustic

upgrades are composed of a cost reduction of 8,300 for APS-116 Inverse Synthetic Aperture Radar and the incorporation of Electronic Measures/Electronic Counter Measures for 21,186 and HARPOON/Self Defense (CHAFF) for 7,717. There were slight decreases of 357 in FY 1981 and 1,110 in FY 1982 as a result of deescalation and a slight increase of 700 for prior year effort. The total program increase of 85,837 reflects the aforementioned changes plus an increase of 2,852 for Project W1639 for integration of communications control group improvements.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9,569	15,095	42,812	44,772	29,985	144,354
W0489	Acoustic Improvements	9,569	10,657	28,002	30,767	19,066	100,272
W1289	Non-Acoustic Improvements	0	4,438	14,810	14,005	10,829	44,082

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy						
W0489 Acoustic Improvements					554,400	554,400
(Quantity)					(160)	(160)
W1289 Non-Acoustic Improvements					365,100	365,100
(Quantity)					(160)	(160)

Program Element: 64217N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: S-3 Weapon System Improvement Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Soviet Naval Force, during the lifetime of the S-3A, will consist of a versatile surface force; quiet, high speed nuclear submarines; advanced surface, sub-surface and air-to-surface missiles and sophisticated command, control and communications systems. Any Soviet threat improvements will degrade the anti-submarine warfare tactical effectiveness of the S-3A beyond the 1980 time frame. The S-3 Weapons System Improvement program was initiated to increase the capability of the S-3A to enable it to effectively counter the submarine threat. The basic design approach to achieve the required performance improvement is to modify, where possible, current S-3A systems in order to minimize new system hardware development and procurement. Provisions will be incorporated in the update configuration to accommodate future acoustic, Electronic Support Measures, weapon, communications, and navigation systems planned for fleet introduction in the late 1980's or early 1990's. Current planning addresses modification of 160 fleet aircraft with an initial operational capability in [ ] This effort will provide improved passive acoustic signal processing capability and an improved radar (with target classification) capability. Integrated logistic support planning will be emphasized throughout the program to insure consistency with existing support policies, to minimize additional maintenance requirements, and to provide for a smooth transition of modified aircraft into the fleet environment. The four prototypes will be utilized for all test phases except for Follow-On Operational Test and Evaluation.

(U) RELATED ACTIVITIES: Air Launched/Ship Launched Anti-Ship Missile, Program Element 25603N (enables HARPOON capability); Airborne Anti-Submarine Warfare Developments (Passive Doppler Tracking project), Program Element 64219N (algorithms being developed for advanced signal processor); Aircraft Carrier Anti-Submarine Warfare Module, Program Element 63228N (carrier processes data); Advanced Acoustic Processing, Program Element 63708N (software package development for Advanced Signal Processor); Acoustic Search Sensors (Advanced Sonobuoy Communications Link project), Program Element 64261N (improved receiver capability); Acoustic Communications (Integrated Acoustic Communications System project), Program Element 64566N; Advanced Signal Processor, Program Element 64266N (expanded processor capability); Surface and Aerospace Target Surveillance Technology (Project PROFILE), Program Element 62712N.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD; Naval Research Laboratory, Washington, DC; Naval Avionics Center, Indianapolis, IN. Contractors: Lockheed Aircraft Corp., Burbank, CA; Texas Instruments, Dallas, TX; IBM, Manassas, VA and Owego, NY; Sperry-UNIVAC, St. Paul, MN; Hazeltine, Greenlawn, NY; Cubic, San Diego, CA; Sanders Corporation, Nashua, NH; McDonnell Astronautics Corporation, St. Charles, MO; Goodyear Aerospace Corporation, Akron, OH.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Initiated program in March 1977. Development proposal presented in September 1978. Conditional full-scale engineering development began in April 1980 with the selection of Lockheed Aircraft Corporation as the integration contractor. Full-scale engineering development program approval occurred in February 1981. Navy Decision

Program Element: 64217N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: S-3 Weapon System Improvement Program
Budget Activity: 4 - Tactical Programs

Coordinating Paper approved by SECNAV in June 1981. Letter contract award to Lockheed Aircraft Corporation occurred in June 1981 for full-scale engineering development. Test and Evaluation Master Plan approved in September 1981. Prepared preliminary software program development specifications and hardware equipment specifications.

2. (U) FY 1982 Program: Detailed design effort continues for final design approach. Preproduction specifications for hardware and software will be finalized. System integration and laboratory update plans will be finalized. Fabrication, integration and testing of prototype units will begin. Automatic test equipment development begins. Development of maintenance plans and logistic support analyses begin.

3. (U) FY 1983 Planned Program: Prototype unit testing continues. Software integration and testing begins. Reliability development testing and built-in-test begins. Automatic test equipment development continues. Development of maintenance plans and logistic support analyses continue. Increased levels of funding in FY 1983 are required to fund increased level of effort associated with full-scale development.

4. (U) FY 1984 Planned Program: Flight testing begins and Navy Preliminary Assessment will be completed. Complete reliability development testing and built-in-test effectiveness testing.

5. (U) Program to Completion: Complete system integration and development testing leading to limited production decision in FY 1985. Limited production in FY 1985 is to be followed by full production start in FY 1987. Initial operational capability will occur [redacted] Modification of 160 aircraft is to be completed by [redacted]

6. (U) Milestones: Not Applicable.

Project: W0489 Title: Acoustic Improvements
Program Element: 64217N Title: S-3 Weapon System Improvement Program
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The S-3A acoustic data processor was designed and developed in the late 1960's and was optimized to early Soviet submarines. Current and projected submarine acoustic signatures are primarily related. An improved acoustic data processor is therefore required to counter the projected threat. Additionally, improvements are required for advanced sensor compatibility and to provide communications capability. The principal acoustic system improvement to meet the projected threat is to provide increased processing which will permit more flexibility. A capability will provide improved search performance against subsurface targets. Communications will be accomplished. Additionally, tactical aids will be incorporated to exploit the capabilities of the acoustic data processor (i.e automatic target fixing techniques, and improved automatic passive acoustic detection and classification aids). The central computer system memory capacity will be increased and the sonobuoy receiver system and sonobuoy reference system will be modified to encompass the new channel sonobuoys.

(U) RELATED ACTIVITIES: Advanced Signal Processor, Program Element 64266N (expanded processor capability); Airborne Anti-Submarine Warfare Developments (Passive Doppler Tracking project), Program Element 64219N (algorithms being developed for Advanced Signal Processor); Aircraft Carrier Anti-Submarine Warfare Module, Program Element 63228N (carrier processes data); Advanced Acoustic Processing, Program Element 63708N (software package development for Advanced Signal Processor); Acoustic Search Sensors (Advanced Sonobuoy Communications Link project), Program Element 64261N (improved receiver capability); Acoustic Communications (Integrated Acoustic Communications System project), Program Element 64566N.

(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: Lockheed Aircraft Corp., Burbank, CA; IBM, Manassas, VA; Sanders Associates, Nashua, NH; Hazeltine, Greenlawn, NY; Cubic, San Diego, CA; Sperry-Univac, St. Paul, MN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Cost and technical analysis was conducted and contained in Development Proposal submitted September 1978. Conditional full-scale engineering development began in April 1980. Full-scale engineering development approved in February 1981. Navy Decision Coordinating Paper approved by SECNAV in June 1981. Letter contract award to Lockheed Aircraft Corporation occurred in June 1981 for full-scale engineering development. Test and Evaluation Master Plan approved in September 1981. Prepared preliminary software program development and hardware equipment specifications.

2. (U) FY 1982 Program: Complete detailed design and initial fabrication of acoustic processor, sonobuoy receiver and sonobuoy reference system. System integration and laboratory update plans will be finalized. Integration and testing o

prototype units will begin. Automatic test equipment development begins. Development of maintenance plans and logistics support analyses begins.

3. (U) FY 1983 Planned Program: Prototype unit testing continues. Software integration and testing begins. Reliability development testing and built-in-test effectiveness testing continue. Automatic test equipment development continues. Development of maintenance plans and logistic support analyses continues. Increased level of funding required for increased level of effort associated with Full-Scale Development.

4. (U) FY 1984 Planned Program: Flight testing begins and Navy Preliminary Assessment will be completed. Complete reliability development testing and built-in-test effectiveness testing.

5. (U) Program To Completion: Complete system integration and development testing leading to limited production in FY 1985. Commence limited production in FY 1985 to be followed by full production start in FY 1987, with initial operational capability in Modification of 160 aircraft is to be completed by

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0489	Acoustic Improvements	10,346	27,309	56,132	39,634	17,216	163,117

Project: W1289
Program Element: 64217N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Non-Acoustic Improvements
Title: S-3 Weapon System Improvement Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The S-3A radar functions as a primary anti-submarine warfare sensor and provides an adjunct surface surveillance capability for the necessary correlation of surface targets. A deficiency exists, however, in the ability of the operator to [redacted] track detected targets. This has historically been a severe constraint of all airborne anti-submarine warfare radar systems. Anti-submarine warfare radar contact investigation frequently results in the interruption of a primary acoustic monitoring responsibility and can potentially place the airplane in a hostile threat environment. Recent technological advances offer the opportunity to significantly improve radar [redacted] and provide an automatic multiple target tracking capability. Expansion of Electronic Support Measures frequency coverage and improved bearing accuracy are required to meet future threats. HARPOON launch capability and chaff and flare dispensing are added for self defense.

(U) RELATED ACTIVITIES: Surface and Aerospace Target Surveillance Technology (Project Profile), Program Element 62712N.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA. Contractor: Lockheed Aircraft Corporation, Burbank, CA; Texas Instruments, Dallas, TX; Sperry-UNIVAC, St. Paul, MN; McDonnell Astronautics Corporation, St. Charles, MO; IBM, Owego, NY; Goodyear Aerospace Corporation, Akron, OH.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: FY 1980 and prior year funding was included in W0489, Acoustic Improvements. Conditional full-scale development began in April 1980. This effort included development of an Inverse Synthetic Aperture Radar Engineering Development Model along with the development of the prototype specifications. Full-scale engineering development program approval occurred in February 1981. Letter contract awarded to Lockheed Aircraft Corporation in June 1981 for full-scale engineering development. Test and Evaluation Master Plan approved in September 1981. Prepared preliminary software program development and hardware equipment specifications.

2. (U) FY 1982 Program: Complete detailed design and initial fabrication of Inverse Synthetic Aperture Radar and HARPOON launch and control system. System integration and laboratory update plans will be finalized. Integration and testing of prototype units will begin. Automatic test equipment development begins. Development of maintenance plans and logistic support analyses begins. Increased levels of funding are required for increased level of effort associated with full-scale engineering development, and to incorporate Electronic Support Measures, HARPOON launch and chaff dispensing.

3. (U) FY 1983 Planned Program: Prototype unit testing continues. Software integration and testing begins. Reliability development testing and built-in-test effectiveness testing begin. Automatic test equipment development continues. Increased level of funding required to fund higher level of effort associated with Full-Scale Development.

Project: W1289 — Title: Non-Acoustic Improvements
Program Element: 64217N — Title: S-3 Weapon System Improvement Program
DoD Mission Area: 233 - Anti-Submarine Warfare — Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue full-scale system integration.

5. (U) Program to Completion: Complete system integration and development testing leading to limited production in FY [ ]. Limited production in FY [ ] will be followed by full production start in [ ]. Initial operational capability will occur in [ ]. Modification of 160 aircraft is to be completed by [ ].

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1289	Non-Acoustic Improvements	4,392	14,393	20,747	14,712	9,978	64,222

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64218N
DoD Mission Area: 235 - Naval Warfare Support

Title: Environmental Systems
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	533	481	356	595	Continuing	Continuing
WO532	Environmental Equipment Support	533	481	356	595	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Perform engineering development to improve Navy environmental support capabilities. Includes: (1) land based and shipboard equipment for receiving and processing data from environmental satellites; (2) taking advantage of technical advances in environmental satellites; (3) adopting environmental subsystems developed by others for Navy operational use.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete engineering development Model II for the expanded environmental satellite recording/receiving system -- redesigned to receive high resolution data from both the Defense Meteorological Satellite Program and national civil satellites. Complete evaluation of the surface-condition analyzer system for predicting critical water depth (hydroplaning) conditions on airfield runways, and the lightning position and tracking system. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary, are as follows: The increase of 112 in FY 1981 results from reprogramming 114 from program element 35111N/project WO943 and a reduction of 2 during development of the FY 1981 budget supplemental. The decrease of 6 in FY 1982 occurred during development of the FY 1982 amended budget. The reduction of 191 in FY 1983 results from decreased escalation rates (-16), FY 1983 budget development decisions (-183) and pay adjustments (+8).

Program Element: 64218N
DoD Mission Area: 235 - Naval Warfare Support

Title: Environmental Systems
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	367	421	487	547	Continuing	Continuing
W0532	Environmental Equipment Support	367	421	487	547	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

m Element: 64218N
ssion Area: 235 - Naval Warfare Support

Title: Environmental Systems
Budget Activity: 4 - Tactical Programs

)ETAILED BACKGROUND AND DESCRIPTION: Measurement of physical properties of the atmosphere is requisite to the ability to .be and subsequently predict changes that occur therein. Likewise, advanced electromagnetic (radar) systems, improved ice measurements from satellites, and the development of new weapons systems utilizing electro-optic equipment have highed the fact that measurements of some atmospheric properties are not attainable to the degree required with current Navy ional meteorological equipment. There are some systems in existence or under development by private industry or other ment agencies that, with proper engineering changes, can meet many of the Navy's measurement requirements at a minimal cost.

:LATED ACTIVITIES: Effort is related to Program Element 63207N, Environmental Applications (Project WO514, Meteorological ·ing System).

)RK PERFORMED BY: In-House: Naval Avionics Center, Indianapolis, IN; Office of Naval Research, Arlington, VA.

tOGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

J) FY 1981 and Prior Accomplishments: Work was started in FY 1978 to modify the existing Navy operational environmental lite receiving/recording system to receive newly available, very high resolution data. Initial work included design and ering of a feasibility model with the capability to receive encrypted Defense Meteorological Satellite Program data, and tion of the required tests and evaluation of the system. Engineering development Model I has been completed and has copied time Defense Meteorological Satellite Program transmissions. All major system interfaces, 2-times and 4-times picture gement, and gray scale enhancement capabilities have been verified. Evaluation of the expanded satellite receiving/recording n design to receive high resolution civil satellite data also is currently underway. The current operational Navy weather --with many obsolete components--was becoming increasingly difficult and expensive to maintain. Work started in FY 1978 to lgn and test a new pulse forming network and to redesign the intermediate frequency attenuator for the Weather Radar has been eted. (These minor upgrade modifications were necessary interim fixes to extend the operational life of these radars into late 1990's when the Joint Defense/Commerce/Transportation advanced radar is scheduled to replace current weather radars.) ation of the Surface Condition Analyzer system (which remotely measures air temperature, runway surface temperature, and surface conditions - clear, wet, slush, ice) was completed in FY 1978. This system was evaluated to determine critical lons regarding: (a) ice control chemical spreading and (b) the potential applicability of an advanced system capable of)ring runway water depth and relating those measurements to runway traction that was installed in July 1981 at Naval Air)n Pensacola. A lightning position and tracking system, installed at Naval Air Station Cecil Field in 1980, is currently going testing for Navy utilization in locating and tracking lightning and severe storms in support of shorebased air opera-, aircraft refueling operations, severe weather warnings and munition handling operations.

Program Element: 64218N
DoD Mission Area: 235 - Naval Warfare Support

Title: Environmental Systems
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Proceed with design evaluation of the engineering development shipboard configuration of the expanded satellite system. Conduct engineering development evaluation and field test of critical water-depth sensor of the Surface Condition Analyzer system and the lightning positioning and tracking system for possible Navy-wide operation use. Coordinate Navy input to development of advanced weather radar in cooperation with the national weather radar plan.

3. (U) FY 1983 Planned Program: Complete engineering development model II for the expanded satellite receiving/recording system. Complete technical evaluation for the Surface Condition Analyzer, critical water-depth system and a lightning position and tracking system for possible Navy-wide use.

4. (U) FY 1984 Planned Program: Complete integrated logistic support and manuals, operational evaluation, and obtain approval for service use for the expanded environmental satellite receiving/recording system. Initiate engineering development plan for Navy participation in an advanced weather radar network as a part of the Joint Defense/Commerce/Transportation advanced weather radar program. Start an engineering development plan for electro-optic environmental sensors. Begin full scale engineering development of shipboard display of Naval Environemtal Display System-type equipment.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64219N
Title: Airborne Anti-Submarine Warfare Developments
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12,919	21,599	25,539	32,148	Continuing	Continuing
W0484	Anti-Submarine Warfare Avionics Improvements	600	0	0	0	0	46,933
W0485	SH-3 Update	760	4,223	3,099	TBD	TBD	TBD
	Quantity		(T&E)	(T&E)			(4)*
X0486	Anti-Submarine Warfare Operations Center	4,192	4,547	5,713	2,654	Continuing	Continuing
	Quantity					(Prototype, T&E)	(1)
W0490	Project BEARTRAP	5,367	3,708	4,647	4,823	Continuing	Continuing
W1442	SH-2 Reliability Readiness Improvement	0	8,121	10,090	13,803	10,040	42,054
W1577	Crown Helicopter	2,000	1,000	1,990	10,868	11,820	27,678
	Quantity					(Prototype)	(1)

*One Sonar system, two Data Display Systems and one Tactical Navigation System

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for the transition through engineering development of acoustic and non-acoustic projects involving airborne anti-submarine warfare equipments, platforms and sensors. The mission need responds to the fleet's request to improve the Navy's air anti-submarine warfare capability to counter the existing and projected submarine threat.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project BEARTRAP: Complete new system design for acoustic intercept in BEARTRAP aircraft, continue development of BEARTRAP capability in P-3C UPDATE III airframes and continue development of [redacted] sonobuoys. The funds in Anti-Submarine Warfare Operations Center are for the continued development of software modifications, analysis efforts in support of updated platforms, completion of the central processor enhancement (preprocessor) and initiation of the upgrade system specification. The increase in funds from FY 1982 to FY 1983 is required to procure prototype equipment and develop system software for the system upgrade. For the SH-3 Update, complete flight testing of Data Display System, continue fabrication of service test models, begin technical/operational evaluation of improved helicopter sonar system (AN/SQS-13F), complete fabrication of modifications to tactical navigation computer, and conduct environmental and flight tests. SH-2 Reliability Readiness Improvement will commence static, fatigue and whirl tests of main rotor blade. Test article fabrication

of the composite tail rotor pylon and main gear box improvements will commence. Complete design of the main rotor system; begin tooling design and fabrication of main rotor system. Continue Crown Helo avionics upgrade. As this is a continuing program, the above outyear funding profile includes escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows: The FY 1981 total program increase of $1,581 reflects reprogramming ($1,600) into Project BEARTRAP for Active Multiple Ping sonobuoy development, reprogramming ($65) into SH-3 Update to support a mission tape recorder evaluation, and deescalation (-$84). The FY 1982 total program reduction of $1,042 reflects restructuring of Acoustic Performance Prediction (-$828) for high priority programs resulting in a delayed start of three years and deescalation (-$214). The FY 1983 total program reflects improved funding of the SH-2 Readiness Reliability Improvement program, JCS directed funding of Crown Helicopter, delay of Acoustic Performance Prediction, and the restructure of Anti-Submarine Warfare Operations Center.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	15,919	11,338	22,641	TBD	TBD	TBD
W0484	Anti-Submarine Warfare Avionics Improvements	3,387	600	0	TBD	TBD	TBD
W0485	SH-3 Update	673	695	4,227	TBD	TBD	TBD
X0486	Anti-Submarine Warfare Operations Center	1,651	4,276	4,597	TBD	TBD	TBD
W0490	Project BEARTRAP	5,926	3,767	3,768	TBD	TBD	TBD
W1102	Passive Doppler Tracking	3,712	*	*	*	*	*
W1161	Integrated Digital Magnetometer	570	0	0	TBD	TBD	TBD
S1396	Acoustic Performance Prediction	0	0	828	TBD	TBD	TBD
W1442	SH-2 Reliability Readiness Improvement	0	0	8,221	TBD	TBD	TBD
W1577	Crown Helo	0	2,000	1,000	TBD	TBD	TBD

* Funded in Program Element 64261N

Program Element: 64219N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Airborne Anti-Submarine Warfare Developments
Budget Activity: 4 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
(U) OTHER APPROPRIATIONS FUNDS:						
Aircraft Procurement, Navy						
W1442 SH-2 Reliability Readiness Improvement (Quantity)	0	0	0	2,700	TBD (various)	TBD (various)
Other Procurement, Navy						
X0486 Anti-Submarine Warfare Operations Center (Quantity)	0	2,547	11,749	8,057	TBD (various)	TBD (various)

Program E'ement: 64219N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Airborne Anti-Submarine Warfare Developments
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: W0484, ANTI-SUBMARINE WARFARE AVIONICS IMPROVEMENTS - Provides for the integration and test and evaluation of a new, improved acoustic system (including the Advanced Signal Processor) into the P-3C weapon system to improve its ability to counter the Soviet submarine force. W0485, SH-3 UPDATE - The SH-3H is the Navy's current carrier inner-zone anti-submarine warfare helicopter. The Update program includes a Service Life Extension analysis as well as an aircraft avionics improvement program. The improved avionics being developed in this project is being considered for incorporation in Program Element 64228N, SH-60 Carrier Helicopter, a new start in FY 1983 which will replace the SH-3H on the carrier. W1442, SH-2 Reliability Readiness Improvement - The SH-2F LAMPS MK I program is an integrated anti-submarine warfare/anti-ship surveillance and targeting system that operates from destroyers to increase and extend the destroyer sensor and weapon capability. The Navy intends to employ the SH-2F aboard LAMPS MK I capable ships through the 2000-2005 time frame. The SH-2F Readiness Improvement Program resulted from the recommendations of the CNO Executive Board in April 1980. Four improvements were identified as life-cycle cost effective and having the greatest impact on readiness. The determination was made to redesign the dynamic components (main motor hub, blades, and main transmission) and tail rotor pylon. X0486, ANTI-SUBMARINE WARFARE OPERATIONS CENTER - Provides Anti-Submarine Warfare Operations Center activities with the capability to interface with and support mission flight operations of anti-submarine warfare aircraft. Nineteen sites are operational, including overseas bases. Objectives are to provide hardware and software development required to enable the Anti-Submarine Warfare Operations Center to support P-3C aircraft (including all system updates), P-3A/B (including the P-3B modernization program) and S-3A, SH-3 and SH-2 aircraft ashore as well as non-automated allied anti-submarine warfare aircraft. W0490, PROJECT BEARTRAP - Provides for the development of an aircraft system with advanced acoustic information collection capabilities. The BEARTRAP aircraft provides the fleet with the ability to support the anti-submarine warfare community in the acquisition, recording and interpretation of non-US submarine acoustic information. W1577, Crown Helo - Provides for a complete avionics upgrade to "state of the art" equipment including electromagnetic pulse hardening, long range communications, and self contained navigation and weather radar systems.

(U) RELATED ACTIVITIES: Program Element 63228N, Carrier Anti-Submarine Warfare Module, project S0517, provides aircraft carriers with the capability to provide pre-mission, in flight and post-mission information exchange, storage, correlation, processing and display of the anti-submarine warfare data. Program Element 64261N, Acoustic Search Sensors (Engineering), provides the acoustic sensors which will be utilized by the Anti-Submarine Warfare Avionics Improvements project. Program Element 64221N, P-3 Modernization, is developing sensor and communications improvements to the P-3 which will be supported by the Anti-Submarine Warfare Operations Center project. Anti-Submarine Warfare Operations Center participates with Program Element 64711N, Navy Command and Control System. Program Element 64228N, SH-60 Carrier Helicopter, will incorporate avionics improvements being developed in the SH-3 Update Program.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA (lead laboratory); Naval Air Test Center, Patuxent River, MD.; Land Based Test Site, Naval Electronics Systems Command Detachment, Patuxent River, Md. Contractors: Sanders Associates, Nashua, NH; Magnavox, Ft. Wayne, IN; Hazeltine Corporation, Avon, MA; Raytheon Corporation, Portsmouth, RI; Sparton Corporation, Jackson, MI; Texas Instruments, Dallas, TX; Dalmo Victor, Burlingame, CA; Lockheed California Corporation, Burbank, CA; Interstate Electronics Corporation, Anaheim, CA; Autonetics, North American Rockwell, Anaheim, CA; Sperry-Rand, Minneapolis,

Program Element: 64219N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Airborne Anti-Submarine Warfare Developments
Budget Activity: 4 - Tactical Programs

MN; IBM, Manassas, VA; Bendix Electrodynamics , Sylmar, CA; Booz-Allen Applied Research, Bethesda, MD; Science Applications Incorporated, McLean, VA; Vitro Laboratories, Silver Spring, MD; Kaman Aerospace Corporation, Bloomfield, CT; and Sikorsky Aircraft Division/United Technologies, Stratford, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: SH-3 UPDATE - The high frequency passive improvement program to the SQS-13 series helicopter variable depth sonar successfully completed Navy testing during FY 1980. During FY 1981 the high frequency passive improvement was combined with the Data Display system to provide a more reliable multi-purpose recorder with increased capabilities. The improved, deep depth helicopter sonar system, AN/SQS-13F was initiated in FY 1981. The mission tape recorder feasibility demonstration was successfully completed. A tactical navigation update which will improve the capacity and computational speed of the ASW-123 Tactical Navigation System was also initiated in FY 1981. Supported anti-submarine warfare operations through software development and hardware improvements to the current Anti-Submarine Warfare Operations Center configuration. Project BEARTRAP equipped P-3C series aircraft have been delivered to the fleet; improvements to software algorithms have continued; Project BEARTRAP aircraft have been equipped with systems and the Direct Measurement Program to gather information has continued.

2. (U) FY 1982 Program: SH-3 UPDATE - Data review to be completed and service test model fabrication to begin on the improved helicopter sonar, AN/SQS-13F. Flight testing will commence on engineering development model number 1 of the Data Display System and additional software functions will be incorporated in engineering development model number 2. Engineering design will be completed and engineering development models fabricated for the tactical navigation improvement. Project BEARTRAP - Update operational software for Project BEARTRAP aircraft. Commence new system design for capability in designated Project BEARTRAP aircraft, and continue development of sonobuoys. Develop software modifications and hardware improvements to the Anti-Submarine Warfare Operations Center to support platform updates, acoustic processor reliability improvement, central processing unit enhancement, and a tape operating system upgrade. Initiate system specification for the Anti-Submarine Warfare Operations Center update program. SH-2F Reliability Readiness Improvement - Award contract to commence engineering design and development of the composite main rotor blade, main gear box improvements, and composite tail pylon. Initiate main tooling efforts and develop fabrication techniques for composite materials. Commence Crown Helo avionics upgrade.

3. (U) FY 1983 Planned Program: SH-3 Update is to obtain approval for production of the Data Display System. Complete fabrication and begin evaluation of new helicopter sonar system, AN/SQS-3F. Tactical navigation update fabrication and testing will be completed. Anti-Submarine Warfare Operations Center - Procure prototype hardware, develop software and specify interfaces for the update system. Continue current system upgrades for platform compatability. Project BEARTRAP - Continue development of BEARTRAP capability in P-3C UPDATE III airframes. Complete redesign for in designated project BEARTRAP aircraft, and continue development of sonobuoys. For SH-2F Reliability Readiness Improvement, complete tool

fabrication for prototype test articles, and commence contractor static, fatigue, and whirl tests. Test program will be developed and reliability and maintainability figures will be evaluated. Planning for integrated logistics support will commence. Continue Crown Helo system avionics comparisons, tests, application, evaluation, installation and hot mockup.

4. (U) FY 1984 Planned Program: SH-3 Update - Perform test and evaluation to obtain production approval of the helicopter low frequency sonar, AN/SQS-13F. Continue software design and integration efforts of the Anti-Submarine Warfare Operations Center upgrade system. Continue development of the tape operating system improvement. Project BEARTRAP, begin transition of passive doppler tracking capability into the AN/AQA-7(V)8 in BEARTRAP aircraft. Complete development of BEARTRAP capability in P-3C Update III airframes, and continue development of [redacted] sonobuoys. For SH-2 Reliability Readiness Improvement, complete static, fatigue, endurance, and whirl test of dynamic components. Initiate flight tests of main rotor blade. Commence technical and operational evaluation, initiate production of tail rotor pylon. Continue Crown Helo aircraft system installation, flight evaluation, and mission compatibility evaluation.

5. (U) Program to Completion: Complete implementation of BEARTRAP capability in a P-3C Update III aircraft; complete operational software improvements in Project BEARTRAP; and complete direct measurement collection effort with [redacted] sonobuoys [redacted] Project BEARTRAP is a continuing program. Maintain compatibility with air anti-submarine warfare platforms through continued software and hardware improvements of the Anti-Submarine Warfare Operations Center, a continuing program. For SH-2 Reliability Readiness Improvement, complete technical and operational evaluation. Crown Helo, install avionics upgrade package in all Crown Helos. Initiate Acoustic Performance Prediction in FY 1985.

6. (U) Milestones: Not applicable.

Project: X0486 — Title: ASW Operations Center
Program Element: 64219N — Title: Airborne Anti-Submarine Warfare Developments
DoD Mission Area: 233 - Anti-Submarine Warfare — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Anti-Submarine Warfare Operations Centers were implemented in the fleet in the 1970s to support the P-3 and S-3 air ASW weapon systems. Computer integrated avionics in anti-submarine warfare aircraft require the fleet to have the capability to receive, store, correlate and display increased amounts of digital information and to process increased amounts of sensor inputs in accelerated time. Evaluated data is needed to brief aircrews prior to departing on a mission and to support tactical operations enroute to and at the scene of action. The information gathered at the scene of action also needs to be made available to the decision making echelons. There are 19 Anti-Submarine Warfare Operations Centers in operation. Fifteen are in direct tactical support of air anti-submarine warfare weapon systems in the Continental United States and at overseas bases.

(U) RELATED ACTIVITIES: The Anti-Submarine Warfare Operations Center supports related activities (project W0490, Project BEARTRAP and project W0484, Anti-Submarine Warfare Avionics Improvements) under Program Element 64219N. Program Element 64221N, P-3 Modernization, is developing sensor and communications improvements to the P-3 which will be supported by the update program. Program Element 64217N, S-3 Weapon Systems Improvement Program, will be supported when operated ashore. Program Element 64711N, Navy Command and Control System, will be interfaced with. Program Element 63228N, Carrier Anti-Submarine Warfare Module, will use some common hardware.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Command Detachment, Patuxent River, MD. Contractors: TRACOR, INC., Rockville, MD; MANTECH of New Jersey, Arlington, VA; Sperry Univac, Arlington, VA; Booz-Allen Applied Research, Bethesda, MD; and Vitro Laboratories Division of Automation Industries, Inc., Silver Spring, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: Since the first Anti-Submarine Warfare Operations Center site, a Research, Development, Test and Evaluation facility was installed at Patuxent River, MD in April 1970, 18 other Anti-Submarine Warfare Operations Center sites have been procured, installed, and activated. The first operational site was installed at Keflavik, Iceland in November 1970, and the most recent operational Anti-Submarine Warfare Operations Center (an abbreviated facility consisting only of acoustic processing and communications capabilities) was activated at Diego Garcia in April 1981. Anti-Submarine Warfare Operations Center systems have been constantly updated, modified, and enhanced in reaction to new requirements. The expansions have been responsive to hardware and software modifications in air anti-submarine warfare platforms, Data Link 11, and the Navy Command and Control System. The Anti-Submarine Warfare Operations Centers were originally designed with off-the-shelf hardware. A system upgrade program has been initiated concurrently with ongoing improvement efforts in order to improve the responsiveness of the system to future platform requirements as well as addressing subsystem obsolescence.

Project: X0486 Title: ASW Operations Center
Program Element: 64219N Title: Airborne Anti-Submarine Warfare Developments
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Develop the Anti-Submarine Warfare Operations Center Upgrade specification; continue platform updates; continue acoustic processor improvement; continue software development and integration; initiate tape operating system development; continue platform simulator development; develop command, control and communications system interfaces; continue central processor unit improvement and preprocessor development; determine electronic support measures requirements; develop equipment replacements; and develop an engineering assessment of the Mobile Operations Control Center.

3. (U) FY 1983 Planned Program: Acquire Anti-Submarine Warfare Operations Center upgrade system prototype equipment and initiate system hardware/software integration; continue Anti-Submarine Warfare Operations Center tape operating system developments and continue central processor unit preprocessor effort. Continue platform updates, software development and integration, command, control and communications interface, and electronic support measures efforts. The increase in funding of $1,166 from FY 1982 to FY 1983 is required to procure prototype equipment and develop system software for the Anti-Submarine Warfare Operations Center system upgrade.

4. (U) FY 1984 Planned Program: Continued development of the tape operating system, operational software and platform updates, and system upgrade are the major efforts for FY 1984.

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

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0486	Anti-Submarine Warfare Operations Center	4,192	4,547	5,713	2,654	Continuing	Continuing

Project: W1442 Title: SH-2 Reliability Readiness Improvement
Program Element: 64219N Title: Airborne Anti-Submarine Warfare Developments
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The SH-2F LAMPS MK I primary mission is anti-submarine warfare/anti-ship surveillance and targeting. The SH-2F helicopter operates from the deck of destroyers, cruisers and frigates to increase and extend the shipboard sensor and weapon capability. This mode of operations subjects the aircraft to a severe corrosion environment. The Navy intends to continue to deploy the SH-2F aboard LAMPS MK I capable ships through the 2000-2005 timeframe. This program provides for the development of a composite main rotor blade for the SH-2F. The new blade will be developed to eliminate the metallic parts of the blade that otherwise limit the life of the present blade due to corrosion and/or fatigue. This program provides for the redesign and development of substantial improvements to the main gearbox in five major areas: planetary gear reduction system, upper housing tail rotor power take-off shaft forward bearing, the rotor shaft lower oil seal, main level gear, and plant carrier lock nut. It also provides for the design and development of an improved composite tail pylon and horizontal stabilizer. Changes such as number of engines and overall gross weight of the SH-2 modified the loads and the vibratory conditions. These changes in load distribution, frequency, and amplitude have compiled a history of failures in both the outer skins and the frame assembly. The new composite pylon will feature improvements such as lighter overall weight, less detail parts and will be less subject to fatigue and corrosion damage increasing reliability and maintainability at all maintenance levels. Provides for a conceptual design for a new technology composite rotor head which combines a spherical and a cylindrical elastomeric bearing to accommodate flapping, lead-lag, and pitch motion. The use of this type bearing is planned to minimize the strain that any element of the bearing must endure in allowing the necessary full articulating motions. Bearing life and durability are affected directly, not only by operational flight loading and conditions, but also by long term static loads due to blade droop conditions. Substantial savings in operational costs are anticipated to accrue due to elimination of lubrication requirements and overhaul requirements. The concept has as its objective a significant reduction in maintenance requirements over the present rotor system; improvements in fatigue and service life; reduced weight and drag; and greater reliability. It will, however retain the simple folding capability of the present rotor. This concept is a low risk approach to achieving greater reliability and improved readiness at a lower cost.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-House: Naval Air Test Center, Patuxent River, MD. Contractors: Kaman Aerospace, Bloomfield, Ct.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Not applicable.

2. (U) FY 1982 Program: The SH-2F Reliability Readiness Improvement Program is a new start in FY 1982. Initiate engineering design and development of the composite main rotor blade, composite tail rotor pylon, main rotor system, and main gearbox following contract award. Tooling design and fabrication techniques for the main rotor blade, tail pylon, and main gearbox improvements will be initiated. Test article main rotor blade fabrication will begin.

Project: W1442
Program Element: 64219N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: SH-2 Reliability Readiness Improvement
Title: Airborne Anti-Submarine Warfare Developments
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Engineering design and development will continue on the main rotor system. Test article fabrication of the composite tail rotor pylon and main gearbox improvements will commence. Static, fatigue and whirl tests of the composite main rotor blade will commence. Tooling design and fabrication of main rotor system will begin.

4. (U) FY 1984 Planned Program: Test article fabrication of the composite tail rotor pylon, main gearbox improvements and main rotor system will continue. Fatigue and whirl test of the main rotor blade will continue and contractor flight test will commence. Begin Navy technical and operational evaluation of main rotor blade. Endurance bench tests of main gearbox improvements commence.

5. (U) Program to Completion: Continue both contractor and Navy testing phases. Obtain production approval where required. Release for production and commence fleet retrofit program.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1442	SH-2 Reliability Readiness Improvement	0	8,121	10,090	13,803	10,040	42,054

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64220N
Title: Aircraft Infrared Signature Suppression
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,322	1,400	1,495	1,598	Continuing	Continuing
W0632	Aircraft Infrared Signature Suppression	1,322	1,400	1,495	1,598	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for the development of airframe and engine modifications designed to reduce aircraft susceptibility to heat seeking missiles and enhance aircraft survivability in penentrating enemy defense zones.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete fabrication, test and evaluation of zero drag, hot metal and plume infrared suppressor ship set for the CH-46E helicopter. Complete installation, ground and flight test evaluation of aerosol spray system on single engine test aircraft in military and after burner power settings. Complete infrared signature analysis for the C-130 and the SH-60 LAMPS helicopter using the modified SCORPION computer model. Conduct signature and susceptibility analyses as required. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary (+$; in FY 1981, -$18 in FY 1982 and -$49 in FY 1983) are the result of refined cost estimates and budget adjustments.

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,045	1,321	1,418	1,544	Continuing	Continuing
W0632	Aircraft Infrared Signature Suppression	1,045	1,321	1,418	1,544	Continuing	Continuing

Program Element: 64220N
Title: Aircraft Infrared Signature Suppression
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATIONS FUNDS: Procurements related to this R&D effort are included in fixed wing and helo airframe/power plant aircraft procurements (APN) appropriations.

lement: 64220N
on Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: Aircraft Infrared Signature Suppression
Budget Activity: 4 - Tactical Programs

LED BACKGROUND AND DESCRIPTION: Enemy infrared guided missiles (both air-to-air and ground-to-air) home on the hot metal e radiation which constitutes the aircraft engine exhaust system Infrared (IR) signatures. Incorporation of infrared rs on Navy/Marine Corps aircraft is required to reduce aircraft vulnerability and enhance survivability. Objectives are velop air cooled infrared suppressors [

rformance of state of the-art infrared suppressors is characterized as follows:

Installed weight -[
Power loss -[
Specific Fuel Consumption increase[
Maximum speed reduction -[
Infrared Signature reduction -[

ED ACTIVITIES: This project will be coordinated with Program Elements 63212N, Tactical Air Infrared Countermeasures, and Helicopter Infrared Countermeasures as an integral part of the total Infrared Countermeasure suite development for ne Corps aircraft. Tri-service coordination is provided through the Joint Technical Coordinating Group Aircraft lity Committee, and directly with cognizant Army and Air Force offices, to assure that tri-service needs are met where e and to avoid the possibility of duplication of effort.

PERFORMED BY: In-house: Naval Weapons Center, China Lake, CA; Naval Air Propulsion Center, West Trenton, NJ; Naval Air er, Patuxent River, MD; Pacific Missile Test Center, Pt. Mugu, CA. Contractors: SIKORSKY, Stamford, CT; Hughes r, Culver City, CA; IITRI, Chicago, IL, Boeing Vertal, Philadelphia, PA; Flight Systems, Mojave, CA; Elana, Zenia, OH ssociates, Princeton, NJ; Vought Corporation, Ft. Worth, TX.

AM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Y 1981 and Prior Accomplishments: [ ]suppression systems were developed for A-7A, CH-46D/E/F, CH-53, OV-H-1E/N and AH-1J aircraft which impose power loss and reduce infrared signature[ ] Infrared nts were completed on A-4A, A-6A, AH-1J, H-46D/E, H-53D/E, OV-10A/D, AV-8A, SH-3, C-130F, F-14A, UH-1N, and P-3C Susceptibility analysis computer program is operational and additional capability is continually being added. AH-1J suppressor development/optimization was completed. Data analysis of flight tests in simulated combat environment with missiles and suppressed aircraft signature was completed/published. Infrared suppressor units have been produced for CH-

Program Element: 64220N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: Aircraft Infrared Signature Suppression
Budget Activity: 4 - Tactical Programs

46D/E/F, CH-53D, AH-1J, UH-1E and OV-10A/D. Advanced helo suppression concept design effort was completed. Low infrared reflective paint Test and Evaluation was performed on AH-1J, TA-4F, CH-46D/E and CH-53A/D.

Performed ground-to-air and air-to-air infrared measurements and seeker look-on tests of P-3C. Conducted infrared and susceptibility analyses.

2. (U) FY 1982 Program: Award contract for Engineering Development Model fabrication and installation and testing of a zero drag hot metal and plume infrared suppressor for ship set CH-46E in fourth quarter FY 1982. Complete wind tunnel tests of aerosol spray system resulting in selection of two most effective aerosols out of five to be tested. Complete spray system design analysis to scale from small scale turbo jet full scale aircraft. Conduct infrared measurements of CH-53E with and without single infrared suppressor on ground in hover. Conduct static infrared measurements of CH-53 engine with and without infrared suppressor installed in a test cell. Conduct susceptibility analyses as needed. Conduct signature and ground-to-air and air-to-air infrared measurements and seeker lock-on tests of A-6E. Compute spectral infrared signature for F-14A computer model.

3. (U) FY 1983 Planned Program:

4. (U) FY 1984 Planned Program:

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare
Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	29,649	18,636	21,598	24,357	63,066	186,289
W1149	Electronic Support Measures Integration	9,706	7,457**	9,211	7,087	0	36,711
W1150	Communications Integration	12,074	5,549	3,728	2,486	0	26,532
W1151	Localization System Integration	1,032	0	0	0	0	6,113
W1152	Advanced Signal Processor Modification	6,817	5,630	8,659	7,275	35,241	74,999
W1501	Searchwater	170*	1,150*	*	0	0	6,600*
W1656	Radar System Improvements	0	0	0	7,509	27,825	35,334
	Quantity (Operational Test and Evaluation)						(35)

Quantities are as follows: 8 for W1149, 7 for W1150, 7 for W1151, 7 for W1152, and 6 for W1656.
*Includes 150 in FY 1981 and 1,150 in FY 1982 funded in PE 65111D, Foreign Weapons Evaluation
**The actual amount is 8,675. $1,218 was erroneously placed in P.E. 63318N when it belonged here.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the modernization of the P-3C avionics suite. Results of a Service Life Extension Program study indicate that the service life of the P-3 airframe is longer than originally expected. The present P-3C avionics suite does not have the sensor growth capacity to counter the emerging threat. This program upgrades several sub-systems and adds a needed dimension of flexibility for the weapon system.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 program initiates the integration of new software (Major System Mode 11) for the Advanced Signal Processor and associated hardware for expanded acoustic capability (increased sonobuoy monitoring, automatic passive tracking, sonobuoy radio frequency channel selection, and broadband analysis) within the P-3C Update III hardware design. Electronic Support Measures and communications system development hardware design approval and reliability and maintainability development tests will be conducted. The increase in funding level from FY 1982 to FY 1983 is required to support the increased level of effort associated with hardware/software integration of Electronic Support Measures into the flying test bed aircraft and the initiation of Major System Mode 11 software/system integration. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The major changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary occurred as a result of added scope to: 1) Integrate a radar imaging system into the P-3C; 2) Increase sonobuoy monitor and processing capability from / 7 channels; 3) Add the automatic capability to passively track acoustic targets; and 4) Provide the ability to utilize 99 sonobuoy radio frequency

Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

channels. The specifics are as follows: The FY 1981 program reflects a total decrease of 3,483 (3,055 reprogrammed into other program elements; 50 reduced contractor support, 378 decreased escalation). In addition, reallocation within the program element was done to accommodate the program restructure resulting from the 1980 SECDEF Inflight Refueling decision. (Electronic Support Measures +2,513; Communications +2,809; Localization -190; and Advanced Signal Processor -8,635.) The Inflight Refueling program was cancelled by SECNAV on 30 May 1981. The FY 1982 program reflects a total decrease of 816 (535 as part of a total Navy research and development budget adjustment; 281 decreased escalation). The FY 1983 program reflects an increase of 15,973 (7,779 for Electronic Support Measures to include added scope for interface modifications to P-3 System (Modernized Logic Units) and schedule slip; 2,708 for Communications schedule slip; 5,799 for implementation of the new Advanced Signal Processor software (Major System Mode 11). Consultant services were reduced by 313. The FY 1984 and outyear program increased by 87,423 (42,516 for continued implementation of Major System Mode 11; 35,334 for imaging radar; and 9,573 to complete the Electronic Support Measures and Communications projects.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	28,701	33,132	19,452	5,625	0	86,910
W1149	Electronic Support Measures Integration	3,216	7,193	7,812	1,540	0	19,761
W1150	Communications Integration	2,675	9,265	5,928	1,068	0	18,936
W1151	Localization System Integration	4,489	1,222	0	0	0	5,711
W1152	Advanced Signal Processor Modification	12,021	15,452	5,712	3,017	0	36,202
W1501	P-3C Inflight Refueling	6,300	0	0	0	0	6,300

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy						
Electronic Support Measures Integration (275 units)	0	0	0	0	217,800	217,800
Communications Integration (275 Units)	0	0	0	0	162,700	162,700
Advanced Signal Processor Modification (198 units)	0	0	35,000	20,500	532,100	587,600

Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The present P-3C avionics suite does not have the sensor growth capacity to effectively counter the emerging faster, quieter submarine threat while operating in an environment of increasing surface threat. Current technology allows sensor improvements, which can be incorporated in production aircraft, to meet the current threat with growth capacity (primarily through modular software, for reduced cost) and to maintain effectiveness against the future threat. In addition, many of these improvements; will be backfittable into earlier P-3 aircraft, which studies have indicated will have longer airframe service life than orignally expected. The specific objectives of the projects contained in this program element are: W1149, ELECTRONIC SUPPORT MEASURES INTEGRATION - Provides for the integration of a new Electronic Support Measures system into the P-3 weapon system with an initial operational capability of The new system

W1150, COMMUNICATIONS INTEGRATION - Provides for the integration of a new communications system into the P-3C with an initial operational capability of The new system will be fully integrated, lowering operator workload, offloading the existing central processor, providing rapid, secure communications. Fleet satellite communications will be provided as well as growth capability to incorporate such future requirements as the Joint Tactical Information Distribution System. W1151, LOCALIZATION SYSTEM INTEGRATION -Provides for the integration of passive acoustic tracking algorithms developed under Program Element 64261N and designed for rapid target localization against high speed, evasive submarines into the AN/AQA-7 acoustic processing system. The hardware changes required to incorporate this capability consist of a modification to the AN/AQA-7 bearing computer, a new AN/AQA-7 control panel, and minor software changes in the AN/ASQ-114 central computer. W1152, ADVANCED SIGNAL PROCESSOR MODIFICATION - Provides for the production incorporation of the P-3C Update III improved acoustic signal processor system (dual display, single analyzer unit version of the Advanced Signal Processor developed in Program Element 64266N) and retrofit into earlier Update series aircraft. Navy test completes in FY 1982. Follow-on software development, integration, and test of the Major System Mode-11 acoustic program will commence in FY 1983 and complete in FY 1986. The MAJOR SYSTEM MODE 11 program effort will expand the acoustic capability of the system to include increased sonobuoy monitor, passive acoustic tracking, channel sonobuoy radio frequency selection, and broadband analysis capabilities within the UPDATE III hardware design. W1656, RADAR SYSTEM IMPROVEMENT - Replaces the current AN/APS-115 with a modified AN/APS-116 radar for Profile capability to improve detection, classification and weapon targeting at Over-the-Horizon ranges. The new radar will also improve man/machine interface, operability, display control, reliability and maintainability. W1501, SEARCHWATER - Project redesignated following Navy cancellation of the Inflight Refueling program. The Searchwater effort consists of a Navy evaluation of the British developed Searchwater over-the-horizon targeting capable radar for possible implementation as a stand-alone system in P-3B series aircraft.

(U) RELATED ACTIVITIES: Program Element 64266N, Advanced Signal Processor, is developing Major System Mode 11 software. Program Element 64217N, S-3 Weapons System Improvement Program, is implementing Profile capability into the AN/APS-116.

Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Air Development Center , Warminster, PA (Lead Laboratory); Naval Air Test Center, Patuxent River, MD. Contractors: IBM, Manassas, VA; Computer Sciences Corporation, Warminster, PA; Lockheed California Company, Burbank, CA; Magnavox, Fort Wayne, IN; SCI Systems, Inc., Huntsville, AL; General Electric Company, Utica, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Electronic Support Measures Integration - A proposal request was prepared, released and contractor responses were received. Communications System Integration - A contract was awarded to SCI Systems, Inc. to modify existing P-3B Communications hardware for application to the P-3C. A contract was also awarded to Lockheed California Co. for modification of a flying test bed aircraft, including installation of a satellite antenna. Localization System Integration - During 1981, Magnavox continued to modify the AN/AQA-7 hardware to accept passive tracking algorithms. Design reviews were conducted on the Interactive Control Panel and Bearing Computer. The Naval Air Development Center completed the equipment functional requirements document and operational specifications necessary to modify the AN/ASQ-114 central computer software. Advanced Signal Processor Modification - Hardware and software integration effort for the P-3C Update III was completed at the Naval Air Development Center. Navy Technical Evaluation was conducted by the Naval Air Test Center. Searchwater - Project W1501 was redesignated Searchwater. Initiated plans for the Navy evaluation of the British developed Searchwater radar for possible implementation in P-3B aircraft.

2. (U) FY 1982 Program: Electronic Support Measures Integration - During FY 1982, an Electronic Support Measures system contractor will be selected and engineering development will begin. Communications Integration - The communications system hardware development will be conducted at the contractor's facility. Advanced Signal Processor Modification - Dual display, single analyzer unit variant of the Advanced Signal Processor will complete Operational Test and Evaluation and obtain Approval for Service Use/Production Approval for the P-3C Update III. Searchwater - Install a Searchwater radar in a P-3B aircraft and initiate Navy test and evaluation.

3. (U) FY 1983 Planned Program: Electronic Support Measures Integration - During FY 1983, Electronic Support Measures design approval tests and reliability development tests will be conducted. Systems will be delivered for design verification, hardware/software integration and aircraft installation. Communications Integration - Communications systems integration tests will take place at the Naval Air Development Center. Design approval tests and reliability development tests will be conducted. Preproduction hardware will be installed in the flying test bed aircraft and functionally tested. Advanced Signal Processor Modification - Software development/integration of Major System Mode-11 sequel program to include Passive Tracking Algorithm will commence with expanded[ ] Low Frequency Analysis and Recording capability and on-line[ ]channel sonobuoy radio frequency capability. Searchwater - Complete the Navy evaluation of the Searchwater radar.

Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

4. (U) FY 1984 Planned Program: Complete the Electronic Support Measures and Communications Systems integration and test and evaluation including system operational and system test software. Continue integration of new Major System Mode-11 software into the Single Advanced Signal Processor acoustic design. Award contract for the modified AN/APS-116 radar and commence hardware/software development.

5. (U) Program to Completion: Advanced Signal Processor improvement will complete development, complete Navy test and obtain service approval for the Major System Mode-11 configuration in FY 1986. The Radar System Improvement will complete testing and receive Approval for Service Use.

6. (U) Milestones: Not Applicable.

Project: W1149 Title: Electronic Support Measures Integration
Program Element: 64221N Title: P-3 Modernization Programs
DoD Mission Area: 233-Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Integrate new Electronic Support Measures system into the P-3C weapon system with initial operating capability of[redacted] The new system will[redacted] These capabilities are attainable with state of the art technology as each has been demonstrated separately in other system developments. This project also includes Modified Logic Unit development, which is an interface update to allow integration of the Electronic Support Measures system into the central processor as well as eliminate logic unit component obsolescence.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD. Contractors: General Electric Company, Utica, NY; Electronic Support Measures system contractor to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Study efforts have assessed mission requirements and defined program scope and direction. A procurement package was issued to industry that stresses high reliability and low maintenance. Contractor proposals were received. Awarded contract for the Modified Logic Units.

2. (U) FY 1982 Program: Electronic Support Measures: Contractor will be selected, contract will be awarded and engineering development will begin. Software will be developed in concert with hardware, including executive and systems test programs. Documentation will be delivered including computer performance specifications and avionics systems specifications. Integration efforts will be planned and test and evaluation preparations made.

3. (U) FY 1983 Planned Program: During FY 1983, design approval tests and reliability development tests will be conducted. Systems will be delivered for design verification, hardware/software integration and installation in the flying test bed aircraft.

4. (U) FY 1984 Planned Program: Complete system integration and test and evaluation including system operational and test software.

5. (U) Program to Completion: Production units will be ordered for delivery to the aircraft contractor. Planned initial operational capability is[redacted]

Project: W1149
Program Element: 64221N
DoD Mission Area: 233-Anti-Submarine Warfare

Title: Electronic Support Measures Integration
Title: P-3 Modernization Programs
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1149	Electronic Support Measures Integration	9,706	7,457**	9,211	7,087	0	36,711

Project: W1150
Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: Communications Integration
Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Integrate new communications system into the P-3C weapon system with an initial operating capability [redacted] The new system will upgrade P-3C communications including secure UHF and HF voice, Anti-Submarine Warfare Information Exchange System and satellite communications with growth capability to include the Joint Tactical Information Distribution System. The fully integrated system will lower operator workload and off-load the aircraft general purpose computer while increasing reliability and maintainability of the entire communications system. The system will also provide rapid communications for HARPOON targeting.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center (NADC), Warminster, PA; Naval Air Test Center (NATC), Patuxent River, MD. Contractors: Lockheed California Company, Burbank, CA; SCI Systems, Inc., Huntsville, AL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A contract was awarded to SCI Systems, Inc. to modify existing P-3B communication hardware for application to the P-3C. A contract was also awarded to Lockheed California Co. for the modification of the flying test bed aircraft, including installation of a satellite communications antenna.

2. (U) FY 1982 Program: Communications systems hardware development will be conducted at the contractors facility. Various satellite communications antenna configurations will be identified for FY 1983 flight tests.

3. (U) FY 1983 Planned Program: During 1983, design approval tests and reliability development tests will be conducted. Communication systems integration tests will take place at Naval Air Development Center. Preproduction hardware will be installed in the flying test bed aircraft and functionally flight tested.

4. (U) FY 1984 Planned Program: Complete system integration and test and evaluation including system operational and system test software.

5. (U) Program to Completion: Production units will be ordered for delivery to the aircraft contractor. The initial operational capability is planned.

6. (U) Milestones: Not Applicable.

Project: W1150
Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: Communications Integration
Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1150	Communications Integration	12,074	5,549	3,728	2,486	0	26,532

Project: W1152 Title: Advanced Signal Processor Modification
Program Element: 64221N Title: P-3 Modernization Programs
DOD Mission Area: 233-Anti-Submarine Warfare Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The project is designed to integrate an improved acoustic suite into P-3C update series aircraft. The P-3C Update III (in production in FY 1983) will incorporate Single Advanced Signal Processor (dual display, single analyzer unit variant of the Advanced Signal Processor), ancillary receiver and antenna systems and provide aircraft design provisions for implementation of Major System Mode-11 capabilities. This system design is suitable for retrofit in earlier P-3 Update I and II aircraft. Major System Mode 11 software will provide an expanded acoustic capability to include increased sonobuoy monitor [ ] Passive Tracking Algorithm, channel sonobuoy radio frequency selection and broadband analysis capabilities. The new software will be modular in design so that future software development required to incorporate advanced sensors, now under development, will be at minimal cost.This system will substantially increase probability of target detection by providing expanded analysis and target classification capabilities to each of two acoustic sensor operators.

(U) RELATED ACTIVITIES: Program Element 64266N, Advanced Signal Processor, is developing Major System Mode-11 software.

(U) WORK PERFORMED BY: In-house: Naval Air Development Center, Warminster, PA (lead laboratory); Naval Air Test Center, Patuxent River, MD. Contractors: IBM, Manassas, VA; Computer Sciences Corporation, Warminster, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In FY 1980, P-3C Update III software development and hardware integration was completed at Naval Air Development Center. Developmental Test and Evaluation was completed by the Naval Air Development Center in March 1981 and Navy Technical Evaluation by the Naval Air Test Center in August 1981. Operational Test and Evaluation commenced on 15 September 1981.

2. (U) FY 1982 Program: Complete Operational Test and Evaluation in January 1982 and obtain production approval for the P-3C Update III.

3. (U) FY 1983 Planned Program: Commence software development/integration of Major System Mode-11 modular program to include Passive Tracking Algorithm, expanded [ ] capability and on-line [ ] channel sonobuoy radio frequency capability.

4. (U) FY 1984 Planned Program: Continue integration of new software into the Single Advanced Signal Processor acoustic design.

5. (U) Program to Completion: Complete development, Navy test and obtain service approval for the Major System Mode-11 configuration.

Project: W1152
Program Element: 64221N
DOD Mission Area: 233-Anti-Submarine Warfare

Title: Advanced Signal Processor Modification
Title: P-3 Modernization Programs
Budget Activity: 4-Tactical Programs

6. (U) Milestones: Not Applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1152	Advanced Signal Processor Modification	6,817	5,630	8,659	7,275	35,241	74,999

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64225N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Radar Warning
Budget Activity: 4-Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,647	383	0	0	TBD	13,602
W0618	Tactical Airborne Radar Warning System	2,647	383	0	0	TBD	13,602
	Quantity (Development/Initial Operational Test and Evaluation)						(7)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Currently deployed radar warning receiver systems in Navy tactical aircraft provide limited signal detection and direction finding capabilities and are not responsive to changes in a dynamic threat environment due to a hardwired signal analyzer. The Advanced Radar Warning Receiver (AN/ALR-67) system will correct this deficiency by incorporating a high speed reprogrammable digital processor with crystal video receivers and a superheterodyne receiver channel, to detect and provide direction finding on all signals [ ] within its operating band. The F-14, F/A-18, A-6E, EA-6B and AV-8A are planned for ALR-67 installations. The digital processor sub-system will be retrofittable into the operational ALR-45 Radar Warning Receiver system in aircraft with limited service life such as the A-7, A-4, F-4, and AV-8C.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Program not funded. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1982.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are +1993 in FY 1981 and -21 in FY 1982 resulting from refined estimates of costs and budget adjustments.

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DEPARTMENT OF THE NAVY SUPPORTING DATA FOR FISCAL YEAR 1983 BUD--ETC(U)
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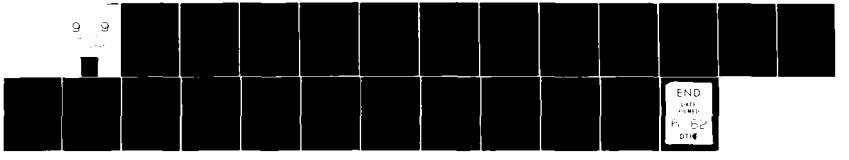

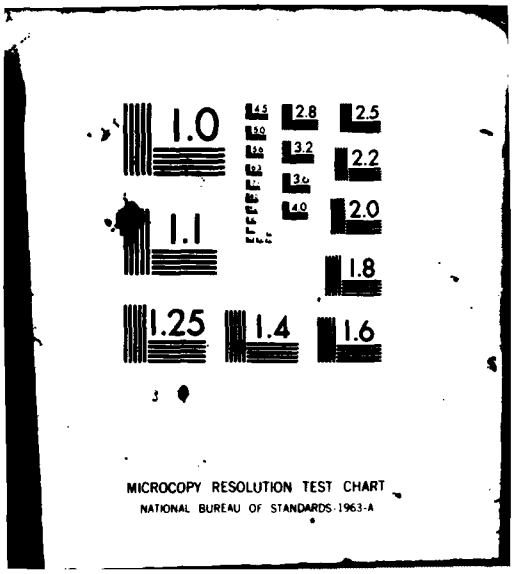
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Program Element: 64225N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Radar Warning
Budget Activity: 4-Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,072	654	404	0	TBD	11,630
W0618	Tactical Airborne Radar Warning System	4,072	654	404	0	TBD	11,630

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy						
AN/ALR-67			21,991	63,985	388,300	474,276
Quantity			(45)	(142)	(527)	(714)
AN/ALR-45F	19,331	13,022	11,083	12,421	66,400	122,257
Quantity	(43)	(82)	(69)	(104)	(442)	(740)

Program Element: 64225N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Radar Warning
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Current radar warning receiver systems in Navy tactical aircraft are limited in performance and are not readily adaptable to changes in a dynamic threat environment. The Advanced Radar Warning Receiver (AN/ALR-67) project will correct these deficiencies by incorporating crystal video receivers and superheterodyne receiver channel to detect and provide direction finding on all signals, within its operating band. The data provided by the receivers is processed in a reprogrammable digital computer to provide threat signal identification and correlation display, data handoff to Electronic Countermeasures equipments and the High Speed Anti-Radiation Missile, and to accept external blanking and control originating from other on-board systems. The AN/ALR-67 is intended to replace the AN/ALR-45 and AN/ALR-50 in designated Navy tactical aircraft and to replace the AN/ALR-42 Systems Integration Receiver in the EA-6B aircraft.

(U) RELATED ACTIVITIES: The reprogrammable digital processor developed for the AN/ALR-67 is such that it may be used to upgrade the capabilities of AN/ALR-45 by direct retrofit into aircraft equipped with AN/ALR-45. The AN/APR-43 has been developed to be compatible with this data processor and together with the AN/ALR-45 receiver, the AN/ALQ-126 A/B, the AN/ALQ-162 and the ALE-39 constitutes the upgraded electronic warfare suite that will be retrofited into aircraft not employing the ALR-67 and ALQ-165. The AN/ALR-67 and the ALR-45F/APR-43 also provides signal hand-off to the High Speed Anti-Radiation Missile (AGM-88) during the missile's "self protect" mode.

(U) WORK PERFORMED BY: In-house: Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Air Test Center, Patuxent River, MD. Contractor: Applied Technology Division, ITEK Corporation, Sunnyvale, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A contract was let in April 1975 with Applied Technology Division, ITEK Corp., Sunnyvale, CA for engineering development models for AN/ALR-67 for EA-6B application. The Engineering Development Model design for both ALR-67 and ALR-45F retrofit processor were completed in FY 1978. In FY 1980, seven ALR-45F systems were delivered and six ALR-67 Engineering Development Models were delivered. Integration testing of ALR-45F with APR-43 and AGM-88 was accomplished. A technical evaluation of the ALR-45F was successfully completed in A-7 aircraft during FY 1980. Integration testing of ALR-45F processor with ALQ-126B continues. ALR-67 initial integration testing with ALQ-99 in the EA-6B was completed during FY 1980. Reliability testing and environmental Qualification Testing was completed in the contractors facility. ALR-45 Operational Evaluation was completed in FY 1981 and production has been initiated. The ALR-67/A-6E Technical Evaluation was initiated in FY 1981.

2. (U) FY 1982 Program: Initiate F-14/F-18 installation of ALR-67. Complete Operational and Technical Evaluation of ALR-67 in A-6E aircraft. Obtain Approval for Service Use and initiate full production.

Program Element: 64225N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Radar Warning
Budget Activity: 4-Tactical Programs

3. (U) FY 1983 Planned Program: Not funded.

4. (U) FY 1984 Planned Program: Not funded.

5. (U) Program to Completion: Research and development phase will be completed in FY 1981 with exception of system improvements.

6. (U) Milestones:

ALR-67 Milestone		Date
Engineering Development Model design complete		June 1977
Initial retrofit processor Engineering Development Model		May 1978
Technical Evaluation ALR-45F		September 1980
Initial ALR-45F Engineering Development Model		December 1978
Operational Evaluation ALR-45F	*(December 1980)	August 1981
Technical Evaluation ALR-67	*(February 1980)	November 1981
Approval for Service Use ALR-45F	*(March 1981)	December 1981
Operational Evaluation ALR-67	*(June 1981)	
Approval for Service Use ALR-67	*(June 1981)	

* Date in parenthesis are milestones shown in FY 1982 Descriptive Summary. ALR-45 Technical Evaluation and Operational Evaluation were delayed due to late delivery of hardware and in-flight performance problems. ALR-45F development delays will cause delay of Approval for Service Use decisions. ALR-67 development delays were caused by EA-6B interface problems resulting in a redesign of the ALR-67/ALQ-99 interface blanking unit. Technical and Operational Evaluations will be delayed.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64226N
Title: Advanced Self Protection System
DoD Mission Area: 371 - Self Protection
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	28,137	23,665	29,331	15,068	Continuing	Continuing
W0619	Airborne Self Protection Jammer Common Development	16,149	6,124	7,230	5,524	Continuing	Continuing
W1481	Airborne Self Protection Jammer Support Equipment and Technology	9,050	3,943	2,624	2,779	Continuing	Continuing
W1482	Airborne [illegible] f Protection Jammer Aircraft Integration	2,938	13,598	19,477	6,765	2,633	45,411
	Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(16ASPJ/8CPMS)*

* 16 Advanced Self Protection Jammers and 8 Comprehensive Power Management Systems

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Airborne Self Protection Jammer is a joint Navy and Air Force program to develop a defensive electromagnetic countermeasures system for self protection of tactical aircraft (F-14, F/A-18, A-6E, EA-6B and F-16) to increase their probability of mission success and survivability when confronted by modern diversified radar controlled weapon systems. The resulting system is to be flexible and compatible with integrated system concepts, and capable of installation in existing aircraft. In addition to the Airborne Self Protection Jammer, the program includes development of support equipment, alternate technology and aircraft integration. An Air Force Comprehensive Power Management System for the ALQ-131 pod is included in the development. This program will complete major component and subsystem development and continue system development through the full scale production decision. Engineering Development Model systems will undergo effectiveness, qualification, and reliability tests and will be utilized in prototype aircraft installations for Development Test and Evaluation and Operational Test and Evaluation. Integrated Logistic Support requirements (reliability, maintenance, and training) will be developed. The Airborne Self Protection Jammer has been designated the AN/ALQ-165. The increase in funds in FY 1983 over FY 1982 is required for increased integration efforts and costs.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue the following: Phase II (Engineering Development Model fabrication, assembly and test) of Airborne Self Protection Jammer Full Scale Development; development and testing of ground support equipment; Alternate Technology efforts to support ALQ-165 development; integration with aircraft, pod and Radar Warning Receivers.

Program Element: 64226N
DoD Mission Area: 371 - Self Protection

Title: Advanced Self Protection System
Budget Activity: 4 - Tactical Programs

The USAF share of Common Development of the Airborne Self Protection Jammer is included in PE 64737F, Project 2712, titled Airborne Self Protection Jammer Common Development. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only except for Project W1482 which reflects total development costs.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary for FY 1981 (-1204), FY 1982 (-579) and FY 1983 (+8206) are the result of refined estimates of costs including escalation. The Program Element was restructured in FY 1981 to allow more precise tracking of the utilization of funds. Factors which affected the FY 1983 funding profile are the installation/integration of the ALQ-165 in Navy aircraft including the addition of the second F-18 and the second F-14 for more efficiency in Test and Evaluation and from the use of contractors' proposals vice in-house engineering estimates.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	13,197	29,341	24,244	21,125	28,833	134,824
W0619	Airborne Self Protection Jammer Common Development	13,197	18,051	6,444	7,525	9,333	72,634
W1481	Airborne Self Protection Jammer Support Equipment and Technology	-	7,042	4,000	2,700	9,600	23,342
W1482	Airborne Self Protection Jammer Aircraft Integration	-	4,248	13,800	10,900	9,900	38,848

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN/O&MN Funds	-	-	-	-	1,304,900	1,304,900
Quantity					(533)	(533)

Program Element: 64226N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Self Protection System
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Airborne Self Protection Jammer ALQ-165 is a joint Navy and Air Force program to develop a Defensive Electromagnetic Countermeasures system for self protection of tactical aircraft (F-14, F/A-18, A-6E, EA-6B and F-16) to increase their probability of mission success and aircraft survivability when confronted by modern diversified radar controlled weapon systems. Development is necessary to counter present and projected threats.

The ALQ-165 is to be flexible, compatible with integrated system concepts and capable of installations in existing aircraft. The Air Force Comprehensive Power Management System (essentially the receiver/processor of the ALQ-165) is included in development. In addition, the program includes development of support equipment such as the Advanced Electronic Warfare Test Set, alternate technology and aircraft integration. The program will complete major component and subsystem development and continue system development through a full scale production decision. Engineering Development Model systems will undergo effectiveness, qualification, and reliability tests and will be utilized in prototype aircraft installations for Development and Operational testing. Integrated Logistic Support requirements (reliability, maintenance, and training) will be developed. The Airborne Self Protection Jammer has been designated the AN/ALQ-165.

(U) RELATED ACTIVITIES: The Advanced Development Model phase of this project was funded under Program Element 63206N. Funding for the Air Force Comprehensive Power Management System and the AN/ALQ-131 is included in PE 64737F which has also provided support for system development and component and subsystem risk reduction efforts related to ALQ-165. The ALR-67 Radar Warning Receiver, funded under PE 64225N, is being interfaced with ALQ-165.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; 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 AFB, OH. Contractors: Doty Associates, Rockville, MD; Hadron, Arlington, VA; Mantech of New Jersey, Arlington, VA; ITT - Westinghouse (Joint Venture Headquarters), Nutley, NJ; Applied Technology Division (ITEK), Sunnyvale, CA; The Analytic Sciences Corp, Reading, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Program Element 63206N funded Airborne Self Protection Jammer from 1969 to 1977. Competitive development on both high-band (Hughes and Raytheon) and low-band (Hughes and Watkins-Johnson) dual-mode Traveling Wave Tubes has been underway since 1972 under cost-plus-fixed fee contracts. Test results on current dual-mode Traveling Wave Tubes are approaching performance requirements. An Advanced Development Model of the ALQ-165 was assembled at the Naval Research Laboratory utilizing current Traveling Wave Tubes and high voltage power supplies developed by Northrop under a cost-plus-fixed fee contract. Terminal threat band electronics, a modified interface control unit from the AN/ALQ-131 and microwave and signal

processing subsystems procured by Naval Research Laboratory, completed the Advanced Development Model. Evaluation of the Advanced Development Model on the Tactical Environment Simulator at Pacific Missile Test Center and at Electronic Warfare Tactical Environment Simulator Fixed Point Test Site at Naval Weapons Center, was successfully completed supporting Research and Development continuation into Full Scale Development efforts. The prime aircraft manufacturers have completed investigations leading to prototype installation engineering. Two contractor teams competed in Phase I (design and critical item demonstration) of ALQ-165 Full Scale Development. One team, ITT/Westinghouse, was selected and awarded a contract for Phase II (fabrication and assembly) of the ALQ-165. Fabrication of the Advanced Electronic Warfare Test Set was nearly completed. For FY 1981 PE 64226N was restructured into three projects to permit better tracking of program tasks, better identification of the common development effort and clearer association with related Air Force efforts. These three projects are: W0619, Airborne Self Protection Jammer Common Development; W1481, Airborne Self Protection Jammer Support Equipment and Technology; and W1482, Airborne Self Protection Jammer Aircraft Integration.

2. (U) FY 1982 Program: Phase II of Full Scale Development consisting of Engineering Development Model fabrication and assembly will continue. Aircraft manufacturers will continue prototype engineering efforts for installation of the ALQ-165 in the F-18 and F-14. Early phases of Development Test and Evaluation will begin.

3. (U) FY 1983 Planned Program: Engineering Development models and Prototype Models of the ALQ-165 will be delivered. These will be used in a Test, Analyze and Fix (TAAF) program. Development Test and Evaluation of the ALQ-165 will continue. Prototype aircraft installations will continue. Development testing of Test Program Sets for the Advanced Electronic Warfare Test Set will continue.

4. (U) FY 1984 Planned Program: Development Test and Evaluation of the ALQ-165 in the F-18 will be completed; Operational Test and Evaluation using Prototype Models of the ALQ-165 in the F-18 will commence. Approval for Service Use of the ALQ-165 in the F-18 and a Defense Systems Acquisition Review Council (DSARC-III) production decision will be obtained.

5. (U) Program to Completion: Complete Development and Operational Testing. Obtain Approval for Service Use of the ALQ-165 in the F-14, A-6E and EA-6B. Commence production.

6. (U) Milestones:

	Milestone		Date
1.	Phase I Full Scale Development Decision for the Advanced Self Protection Jammer		August 1979
2.	Advanced Self Protection Jammer Fabrication and Assembly Contract Award	(June 1981)*	August 1981
3.	Complete installation design specifications for the F-14 and F-18		August 1981
4.	Deliver development model of Advanced Electronic Warfare Test Set for Testing	(December 1981)*	November 1981

Program Element: 64226N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Self Protection System
Budget Activity: 4-Tactical Programs

5. First Advanced Self Protection Jammer (ASPJ) Engineering Development Model Delivery
6. Advanced Self Protection Jammer Reliability/Qualification Tests Complete
7. Advanced Self Protection Jammer in F-18 Technical Evaluations Complete
8. Advanced Self Protection Jammer Approval for Service Use
9. Advanced Self Protection Jammer Serial Production Decision

*Dates in parens are milestone dates shown in FY 1982 Program Element Descriptive Summary. Delays are to allow increased time for Source Selection prior to award of Phase II Advanced Self Protection Jammer contract.

Project: W0619 Title: Advanced Self Protection Jammer Common Development
Program Element: 64226N Title: Advanced Self Protection System
DoD Mission Area: 371 - Self-Protection Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Airborne Self Protection Jammer, ALQ-165, is required to increase Navy and Air Force tactical aircraft survivability and to provide an enhanced probability of mission success. The system is projected to be operational during the mid 1980's and beyond. Research, Development, Test and Evaluation effort leading to the ALQ-165 is required to achieve advanced capabilities for countering projected threats with Electronic Countermeasure techniques not adequately addressed by today's Defensive Electronic Countermeasures;

The ALQ-165 [redacted] is compatible with integrated system concepts and capable of installation in existing aircraft. Sixteen Airborne Self Protection Jammer and eight Comprehensive Power Management System Engineering Development Models are required for system effectiveness evaluation (including flight tests in representative candidate aircraft), reliability tests, qualification test (environmental and electromagnetic interference), and in Test and Evaluation.

(U) RELATED ACTIVITIES: The Advanced Development Model phase of this project was funded under Program Element 63206N. Funding for the Air Force Airborne Self Protection Jammer Common Development (including two of the Sixteen Engineering Development Models), Airborne Self Protection Jammer Development/Integration in the F-16 and F-111 and the Comprehensive Power Management System (to be used in the Air Force ALQ-131 pod) is included in Air Force PE 64737F. It has also provided support for system development and component and subsystem risk reduction efforts related to ALQ-165. The ALQ-67 Radar Warning Receiver, funded under PE 64225N, is being interfaced with ALQ-165.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center; Point Mugu, CA; Naval Weapons Center, China Lake, CA; Aeronautical System Division, Wright-Patterson AFB, OH. Contractors: Doty Associates, Rockville, MD; Hadron, Arlington, VA; and Mantech of New Jersey, Arlington, VA; ITT - Westinghouse (Joint Venture Headquarters), Nutley, NJ; Applied Technology Division (ITEK), Sunnyvale, CA; The Analytic Sciences Corp, Reading, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Competitive development on both high-band (Hughes and Raytheon) and low-band (Hughes and Watkins-Johnson) dual-mode Traveling Wave Tubes has been underway since 1972 under cost-plus-fixed fee contracts. Test results on current dual-mode Traveling Wave Tubes are approaching performance requirements. An Advanced Development Model of the ALQ-165 was assembled at the Naval Research Laboratory utilizing current Traveling Wave Tubes and high voltage power supplies

developed by Northrop under a cost-plus-fixed fee contract. Terminal threat band electronics, a modified interface control unit from the AN/ALQ-131, and microwave and signal processing subsystems procured by Naval Research Laboratory completed the Advanced Development Model. Evaluation of the Advanced Development Model on the Tactical Environment Simulator at Pacific Missile Test Center and at Electronic Warfare Tactical Environment Simulator Fixed Point Test Site at Naval Weapons Center, was successfully completed supporting Research and Development continuation into Full Scale Development efforts. Two contractor teams competed in Phase I (design and critical item demonstration) of Full Scale Development. One team, ITT/Westinghouse, was selected and awarded a contract for Phase II (fabrication and assembly) of Full Scale Development. In FY 1981, PE 64226N was restructured into three projects to permit better tracking of program tasks, better identification of the common development effort, and clearer association with related Air Force efforts. These three projects are: W0619, Airborne Self Protection Jammer Common Development; W1481, Airborne Self Protection Jammer Support Equipment and Technology; and W1482, Airborne Self Protection Jammer Aircraft Integration.

2. (U) FY 1982 Program: Phase II of Full Scale Development consisting of Engineering Development Model fabrication and assembly will continue. Early Phases of the Test Analyze and Fix program will commence.

3. (U) FY 1983 Planned Program: Engineering Development Models and Prototype Models of the ALQ-165 will be delivered. Development Test and Evaluation will continue.

4. (U) FY 1984 Planned Program: Development Test and Evaluation of the ALQ-165 in the F-18 will be completed; Operational Test and Evaluation, using Prototype Models of the ALQ-165, will commence. Approval for Service Use of the ALQ-165 in the F-18 and a Defense Acquisition Review Council (DSARC-III) production decision will be obtained.

5. (U) Program to Completion: Complete Development and Operational Testing. Obtain Approval for Service Use of the ALQ-165 in the F-14, A-6E and EA-6B. Commence production.

Project: W0619
Program Element: 64226N
DoD Mission Area: 371 - Self-Protection

Title: Advanced Self Protection Jammer Common Development
Title: Advanced Self Protection System
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestones		Date
1.	Phase I Full Scale Development Decision	August 1979
2.	Fabrication and Assembly (Phase II) Contract Award	(June 1981)* August 1981
3.	First Engineering Development Model Delivery	
4.	Reliability/Qualification Tests Complete	
5.	Technical Evaluation in F-18 Complete	
6.	Approval for Service Use	
7.	Serial Production Decision	

*Dates in parens are milestone dates shown in FY 1982 Program Element Descriptive Summary. Delays are to allow increased time for Source Selection prior to award of Phase II contract.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0619	Airborne Self Protection Jammer Common Development	16,149	6,124	7,230	5,524	Continuing	Continuing

Project: W0619
Program Element: 64226N
DoD Mission Area: 371 - Self Protection

Title: Airborne Self Protection Jammer Common Development
Title: Advanced Self Protection System
Budget Activity: 4 - Tactical Programs

TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation. The Airborne Self-Protection Jammer will provide advanced capabilities for countering current and projected threats with Electronic Countermeasures techniques not adequately addressed by existing Defensive Electronic Countermeasures systems;

system that is compatible with integrated system concepts and capable of installation in existing aircraft. Air Force participation in the program includes use of the Airborne Self-Protection Jammer in the F-16 (possible other aircraft) and the development of a Comprehensive Power Management System (essentially the Receiver Processor modules being developed for Airborne Self-Protection Jammer). The Comprehensive Power Management System will be used to update Air Force ALQ-131 electronic countermeasure pod systems. A total of fourteen Airborne Self-Protection Jammers and eight Comprehensive Power Management Systems (Engineering Development Models) will be produced by one of the two contactor teams (ITT/Westinghouse; Sanders/Northrop) currently involved in Phase I (design and critical item demonstration) of Full Scale Development. Competitive contracts were awarded to the two teams on 20 August 1979 following Defense System Acquisition Review Council II approval on 16 August 1979. An Advanced Development Model assembled by the Naval Research Laboratory from available subsystems underwent integration and concept testing from October 1975 through August 1976. These tests demonstrated the feasibility of the dual-mode power amplifiers, software reprogrammability and Radar Warning Receiver interface operations. Further testing at the Pacific Missile Test Center Tactical Environment Simulator, the Naval Weapons Center Electronic Warfare Test Site, and technique testing at the Air Force Electronic Warfare Evaluation Simulator demonstrated the system concept and techniques effectiveness against specific threat systems. Future testing will consist of contractor conducted testing to demonstrate environmental qualifications, reliability, maintainability and electromagnetic compatibility. These tests will be conducted on early and intermediate Engineering Development Models. Laboratory testing conducted by Navy/Air Force will be accomplished These tests will stress system performance and investigate operation against particular threat simulations. Ground and flight tests to be conducted on late Engineering Development Models representative of production units will involve measurements of the technical characteristics, installation and interface evaluations, and operational effectiveness criteria. The Engineering Development Model tests in the A-6E and EA-6B will be conducted in Air Force testing of the Comprehensive Power Management System integrated with the ALQ-131 electronic countermeasures pod will parallel the Navy Technical Evaluation. Test facilities include the Tactical Environmental Simulation at Point Mugu, CA; the Electronic Warfare Threat Environment Simulation at China Lake, CA; the Air Force Electronic Warfare Evaluation Simulator at Fort Worth, TX; and the Acquisition Division Test Range at Eglin Air Force Base, FL.

ject: WO619
ogram Element: 64226N
D Mission Area: 371 - Self Protection

Title: Airborne Self Protection Jammer Common Development
Title: Advanced Self Protection System
Budget Activity: 4 - Tactical Programs

(U) Operational Test and Evaluation: Commander, Operational Test and Evaluation Force and Air Force Test and Evaluation Center dependently reviewed tests on the Advanced Development Model, March 1977 - August 1978 which paved the way for commencement of ll Scale Development. They will monitor contractor and Government development testing. Initial Operational Test and Evaluation ll consist of an independent evaluation by Operational Test and Evaluation Force of combined development/operational testing of e Phase II Engineering Development and Prototype Models. This evaluation, conducted by Service personnel, will make preliminary sessments of the Human Factors, to ensure that Service personnel can operate the system efficiently, and of operational itability and effectiveness. After the completion of the Technical Evaluation, an Operational Evaluation will be conducted in by Navy test squadrons, under the direction of Commander, Operational Test and Evaluation Force, using Prototype Models in e F-18 that are representative of production units.

Completion of the Operational Evaluation will ovide the basis for a recommendation by Commander, Operational Test and Evaluation Force regarding Approval for Service Use in e F-18 early in F-14, A-6E and EA-6B testing is proposed to be carried out as Follow on Test and Evaluation. velopment of the Airborne Self Protection Jammer is a Joint Navy/Air Force program. The Navy is Executive Service; the Navy ogram Manager has an Air Force Assistant and an Air Force Deputy for Test and Evaluation. A Joint Test and Evaluation Master an has been approved by the Office of the Secretary of Defense. Test facilities include the Tactical Environment Simulation at int Mugu, CA; the Electronic Warfare Threat Environment Simulation at China Lake, CA; the Air Force Electronic Warfare aluation Simulator at Fort Worth, TX; and the Acquisition Test Range at Eglin Air Force Base, FL.

Project: W0619
Program Element: 64226N
DoD Mission Area: 371 - Self Protection

Title: Airborne Self Protection Jammer Common Development
Title: Advanced Self Protection System
Budget Activity: 4 - Tactical Programs

3. (U) System Characteristics.

a. (U) The following items are to be demonstrated by the developing agency/contractor.

Performance	Goal	Threshold (Variances)
Frequency Coverage (GHz)		
Threat capacity, simultaneous emitters		
Pulse density (pps)		
Output Peak Power		
Output Continuous Wave Power		
Pulse Duty Cycle		
Response Time (seconds)		
Operational Availability		
Mission Reliability		
Maintenance Demand		
Mean Flight Hours Between Maintenance Action (hours)		
Direct Maintenance Manhours/Maintenance Action (hours)		
Logistics Demand		
Mean Flight Hours Between Repair (hours)	21.5	17.0

Project: W1482 Title: Airborne Self Protection Jammer Aircraft Integration
Program Element: 64226N Title: Advanced Self Protection System
DoD Mission Area: 371 - Self-Protection Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project is one of two additional projects formed in FY 1981 from Project W0619, Airborne Self Protection Jammer. The Airborne Self Protection Jammer (ALQ-165) is a Joint Navy/Air Force program to develop a defensive electronic countermeasures capability for self protection of tactical aircraft (F-14, F-18, A-6E, EA-6B, and USAF F-16) to enhance mission success and aircraft survivability when confronted with modern, diversified, radar controlled weapons systems. This project, W1482, supports the integration of the Airborne Self Protection Jammer (ASPJ) (ALQ-165) with the Navy aircraft listed above.

(U) RELATED ACTIVITIES: Early development efforts of the Airborne Self Protection Jammer were funded under Program Element 63206N. Air Force efforts are now funded under Program Element 64737F with Projects under this element for Airborne Self Protection Jammer development, Comprehensive Power Management System development and for integration with Air Force Aircraft and pods. The ALR-67 Radar Warning Receiver, funded under PE 64225N, is being interfaced with the ALQ-165.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Pt. Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Air Test Center, Patuxent River, MD. Contractors: Grumman, Bethpage, NY; MacDonell Douglas, St. Louis, MO.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Preliminary government aircraft installation studies have been completed under Project W0619. Preliminary installation investigations have been completed by the prime aircraft manufacturers.

2. (U) FY 1982 Program: Commence prototype engineering efforts for installation of the ALQ-165 in the F-18 and F-14.

3. (U) FY 1983 Planned Program: Complete prototype installations and check-out in F-18 and continue in the F-14.

4. (U) FY 1984 Planned Program: Complete Development Test and Evaluation of the ALQ-165 in the F-18; commence Operational Test and Evaluation. Complete prototype installation of the ALQ-165 in the F-14; commence Follow-on Test and Evaluation.

5. (U) Program to Completion: Complete operational testing in F-18. Complete Follow-on Test and Evaluation in the F-14, A-6E and EA-6B. Obtain production decision for Airborne Self Protection Jammer and commence installations in aircraft.

Project: W1482
Program Element: 64226N
DoD Mission Area: 371 - Self-Protection

Title: Airborne Self Protection Jammer Aircraft Integration
Title: Advanced Self Protection System
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	Milestone	Date
1.	Associate Contractor Agreements	June 1980
2.	Complete Design Specifications, F-14, F-18	August 1981
3.	Commence Prototype Installations, F-14, F-18	
4.	Complete Prototype Installations in F-18	

* Dates in parens are milestone dates shown in the FY 1982 Program Element Descriptive Summary. Delay is to allow increased time for Source Selection prior to award of Phase II contract.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1482	Airborne Self Protection Jammer Aircraft Integration	2,938	13,598	19,477	6,765	2,633	45,411

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64227N
Title: HARPOON Modifications
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	1,940	1,921	TBD	TBD
W1644	HARPOON Modifications	0	0	1,940	1,921	TBD	TBD

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: HARPOON, along with the TOMAHAWK antiship missile, will constitute the U.S. Navy's primary antisurface warfare weapons systems. HARPOON, in service since 1977, and utilizes late 1960's technology. Planned survivability improvements and guidance improvements for both HARPOON and TOMAHAWK (TOMAHAWK Anti-ship missile uses a variant of the HARPOON guidance package) are being undertaken in PE 28009N TOMAHAWK Improvement Program. This program will support necessary HARPOON improvements which are not common with TOMAHAWK. The first improvement required, and that funded by the FY 1983 and FY 1984 resources listed above, will provide for a hardened warhead for the HARPOON anti-ship missile.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Begin design engineering on warhead changes. Begin analysis to evaluate the impact of missile weight and shift in the center of gravity. Complete hardened warhead test plan. The above funding profile includes outyear escalation and includes all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: Not applicable; this program is an FY 1983 new start.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not applicable.

(U) OTHER APPROPRIATION FUNDS: To be determined.

Program Element: 64227N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: HARPOON Modifications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The HARPOON Anti-Ship Cruise Missile provides the U.S. Navy with an over-the-horizon (60 mile) engagement capability against enemy surface combatants ranging in size from patrol boats to major combatants. HARPOON cruises at high subsonic speeds employing an active radar terminal guidance system to deliver its 500 pound blast warhead. HARPOON has been in service in the U.S. Navy and various allied Navies since 1977. The HARPOON missile employs late 1960's technology.

It has been determined that the basic design of HARPOON is sound and, along with the TOMAHAWK anti-ship missile, can satisfy the Navy's anti-surface missile requirements if certain preplanned product improvement initiatives are implemented. The improvements fall into two categories: (1) guidance and survivability improvements which are being undertaken in PE 28009N TOMAHAWK Improvement Program, and (2) warhead hardening and other HARPOON "only" modifications being undertaken in this Program.

(U) RELATED ACTIVITIES: Survivability and guidance improvement undertaken in Program Element 28009N Project X1661 TOMAHAWK Improvement Program.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA. Contractor: McDonnell Douglas Astronautics Company, St. Louis, MO; Texas Instruments, Dallas, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Several programs sponsored by the Naval Air Systems Command HARPOON Project Office contributed to the preparation of this program as well as the guidance and survivability improvements under PE 28009N Project X1661 TOMAHAWK Improvement Program. These efforts include:

a. A continuing survivability assessment program to evaluate HARPOON in the light of evolving defensive systems.

b. A radar measurements program to gather detailed radar data from a variety of targets and under all environmental and countermeasures situations in order to study existing performance and develop new avenues to future improvements.

c. An anti-ship cruise missile guidance improvement study directed by the Chief of Naval Operations and completed in 1981. The study defined and validated improvement objectives and a conceptual guidance system design.

Program Element: 64227N
Title: HARPOON Modifications
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

d.

e. An extensive evaluation of guidance performance is ongoing utilizing the jointly developed HARPOON/TOMAHAWK simulation facility.

2. (U) FY 1982 Program: Not Applicable.

3. (U) FY 1983 Planned Program: Begin engineering development of the hardened design. Structural, aerodynamic, loads, dynamics, and weight and balance engineering will provide the basis for these modifications and testing. Complete hardened warhead test plan. Determine any other HARPOON mid-life improvements to give the missile increased capability against Soviet defenses.

4. (U) FY 1984 Planned Program: Begin Test and Evaluation of the warhead.

5. (U) Program to Completion: Complete warhead Test and Evaluation. Complete other HARPOON modifications that may be required.

6. (U) Milestones: Not applicable.

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FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64228N
Title: SH-60 Carrier Variant
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4-Tactical Programs

(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	9,868	43,354	34,435	87,657
W1629	SH-60 Carrier Variant	0	0	9,868	43,354	34,435	87,657

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: SH-60 Carrier Variant provides carrier battle groups inner zone Anti-Submarine Warfare protection (within 30 nautical miles) using manned helicopters with acoustic sensors, onboard sonobuoy signal processing, airborne dipping sonar and data link communications. Secondary missions will include search and rescue, logistics support, medical evacuation and aircraft plane guard. The SH-60 Carrier Variant is a derivative of the LAMPS MK III aircraft (SH-60B) and is a replacement for existing carrier Anti-Submarine Warfare helicopters (SH-3H). The program will be accomplished by taking advantage of the SH-60B development; two prototype SH-60B aircraft assets will be available for reconfiguration, test and evaluation. Total planned production program is 128 aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST: A new start in FY 1983, Research and development funding is required to award contracts to the airframe and system integrator to formulate detail design, specification definition, manufacturing plans, and plan the test and evaluation of two modified prototype SH-60Bs. Planning and development to begin at Navy field activities in support of system integration, test and evaluation, ship interface, support equipment, integrated logistics, and program management. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: None.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: None.

Program Element: 64228N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: SH-60 Carrier Variant
Budget Activity: 4-Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Navy	*	*	*	*	2,843,000	2,843,000
Quantity						(128)
Other Procurement, Navy	**	**	**	**	TBD	TBD
Operations and Maintenance, Navy	**	**	**	**	TBD	TBD
Ship Construction, Navy	**	**	**	**	TBD	TBD

* Aircraft Procurement funds to begin in FY 1985 with Advance Aircraft Procurement. Initial spares included in the total estimate.

** Funding level and impacts are being developed for Other Procurement, Operation and Maintenance, Military Construction and Ship construction. No funding in these areas required before FY 1985.

Program Element: 64228N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: SH-60 Carrier Variant
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: SH-60 Variant provides carrier battle groups inner zone anti-submarine warfare protection using manned helicopters with acoustic sensors, onboard sonobuoy signal processing, airborne dipping sonar and data link communications. Secondary missions will include search and rescue, logistics support, medical evacuation and plane guard. SH-60 Carrier Variant is a derivative of the LAMPS MK III aircraft (SH-60B) and is a replacement for existing Anti-Submarine Warfare helicopters (SH-3H). Its avionics suite will consist of developed equipment from the LAMPS MK III program and existing equipment from the SH-3H program. The SH-60 Carrier Variant will provide a mission of hover for airborne dipping sonar) with a crew of four and the capability of two seated passengers. This program will be accomplished by taking advantage of the SH-60B development; two prototype SH-60B aircraft assets will be available for reconfiguration, test and evaluation. Contracts will be signed with the major contractors (system integrator, airframer, and engine) to develop the configuration and test the weapon system. Acceptance by similarity with previously tested identical systems will be formulated to reduce the development costs. Acquisition risk will be minimal because of experience obtained from the SH-60B program.

(U) RELATED ACTIVITIES: Program Element 64206A, UH-60A, BLACK HAWK, (Utility Tactical Transport Aircraft System), a derivative of which has been selected for the LAMPS MK III (Light Airborne Multi-Purpose System) airframe. Program Element 64212N, Light Airborne Multi-Purpose System MK III, SH-60B, the parent aircraft of the SH-60 Carrier Variant.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD; Naval Weapons Engineering Support Activity, Washington, D.C.; Naval Air Engineering Center, Lakehurst, N.J.; Naval Avionics Center, Indianapolis, IN. Contractors: Sikorsky Aircraft Division, Stratford, CT (Air Vehicle); General Electric, Lynn, MA (Engine); Bendix Oceanics, Sylmar, CA (Dipping Sonar); system integrator to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Presentations and preliminary investigations of configuration and effectiveness by interested contractors. No Navy funded effort.

2. (U) FY 1982 Program: Alternative Design Trade Study of the SH-60B at Naval Air Development Center to investigate the configuration feasibility, mission effectiveness, and scheduling alternatives to develop life cycle costs and determine the cost effectiveness of various configurations for the SH-60 Carrier Variant.

3. (U) FY 1983 Planned Program: Funds are required to contract major effort to develop detail design, specification definition, mockup the structural and avionics configuration, and plan the test and evaluation of two modified prototype SH-60Bs.

4. (U) FY 1984 Planned Program: Demonstrate and verify the avionics system integration, modify two prototype SH-60Bs, and conduct production planning.

Program Element: 64228N
Title: SH-60 Carrier Variant
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Flight test the modified aircraft, conduct Navy Preliminary Evaluations and Operational Evaluation aboard a carrier, award production contracts and commence deliveries of production aircraft.

6. (U) Milestones:

Milestones		Date
a.	Award Design Contract	October 1982
b.	Avionics System Integration Demonstration	March 1984
c.	First Flight of SH-60 Carrier Variant-Modified SH-60B	November 1984
d.	Complete Navy Preliminary Evaluation	August 1985
e.	Award Limited Production Contracts	October 1985
f.	Complete Navy Initial Operational Evaluation	June 1986
g.	Award Production Contract	August 1986
h.	First Production Aircraft System Delivery	January 1988
i.	Initial Operating Capability	

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