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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 3 OF 3 BOOKS

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THE MATERIAL SUBMITTED IN THIS VOLUME CONTAINS PROGRAM AND BUDGET INFORMATION IN SUPPORT OF PROGRAM ELEMENT FUNDING REQUESTED IN THE FISCAL YEAR 1983 PRESIDENT'S BUDGET

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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: 64255N Title: Air Electronic Warfare
DoD Mission Area: 374 - Multimission, 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	10,206	11,690	13,394	16,931	Continuing	Continuing
W0539	Foreign Material Exploitation, Tactical Air	1,577	1,976	2,269	2,400	Continuing	Continuing
W0602	Electronic Warfare Environmental Simulation	8,629	9,714	11,125	14,531	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Funds the continuing exploitation of foreign ground and seabased threat material, and provides for the design, fabrication and integration of threat simulators at the Electronic Warfare Threat Environment Simulation Complex.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development of SEA SITE simulators and jammers at Electronic Warfare Threat Environment Simulation Complex, China Lake, CA. Continue improvements to missile model simulation and data reduction/data analyses. Continue improvements to fixed point test and tactical environment simulators and technical support to Commander, Operational Test and Evaluation Force. Continue CROSSBOW-S support. Continue exploitation efforts of foreign ground and seabased threat materials. 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 downward economic and budgetary adjustments. Foreign Material Exploitation, Tactical Air increased $167 in FY 1981, and decreased $230 in FY 1982 and $138 in FY 1983. Electronic Warfare Environmental Simulation decreased $607 in FY 1981, $5,324 in FY 1982, and $3,974 in FY 1983 as a result of budget reductions with a reduction in scope of effort.

Program Element: 64255N
Title: Air Electronic Warfare
DoD Mission Area: 374 - Multimission, Technology & 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	23,612	10,646	17,244	17,506	Continuing	Continuing
W0445	Airborne Electronic Support Measures Equipment	2,300	*	*	*	*	*
W0539	Foreign Material Exploitation, Tactical Air	1,271	1,410	2,206	2,407	Continuing	Continuing
W0602	Electronic Warfare Environmental Simulation	13,675	9,236	15,038	15,099	Continuing	Continuing
W1027	EP-3 Update	6,366	*	*	*	*	*

* Funding transferred to Program Element 35885G, Tactical Cryptologic Activity.

(U) OTHER APPROPRIATIONS FUNDS: None

Program Element: 64255N Title: Air Electronic Warfare
DoD Mission Area: 374 - Multimission, Technology & Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This element is a continuing program of Electronic Warfare development designed to provide: (1) exploitation of foreign ground and sea based threat material; (2) Electronic Warfare environmental simulations for the purpose of testing and evaluating airborne Electronic Warfare equipments and electro-optical devices and for development of tactics to counter enemy surface-to-air weapons systems.

(U) RELATED ACTIVITIES: Related effort with U.S. Air Force and U.S. Army is coordinated through the Tri-Service CROSSBOW-S Project, the Joint Coordinating Committee on Electronic Defense Systems and the mutual use of facilities.

(U) WORK PERFORMED BY: In-house: Pacific Missile Test Center, Pt. Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Surface Weapons Center, Dahlgren, VA. Contractors: Applied Physics Laboratory/Johns Hopkins University, Silver Spring, MD; SWL Inc., McLean, VA; Texas Instruments, Inyokern, CA; Radio Corporation of America, Moorestown, NJ; Flight Services, Inc., Inyokern, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Electronic Warfare Environmental Simulation project originated in August 1967. Interim land based system was operational in the first quarter FY 1969. Advanced land based system was operational in March 1971. First U.S. [ ] simulation was operational in September 1971. First simulation [ ] was operational in September 1972. Exploitation of [ ] was initiated early in FY 1973. Actual [ ] was made partially operational in September 1972. Second operational [ ] was available in December 1972. [ ] simulators available. Continued development of [ ] naval jammers. Continued exploitation of presently available and newly acquired foreign ground and seaborne threat materials. Data obtained used to develop new threat simulations and for evolutionary evaluation of new threat Electronic Counter-Countermeasure techniques. Completed [ ] exploitation efforts. Continued development of Electronic Counter-Countermeasure updates, and augmentation of existing simulators. Completed design definition [ ] Continued [ ] Continued development of [ ] Emitter Simulators. Continued [ ] support.

2. (U) FY 1982 Program: Continue exploitation of foreign ground and seaborne threat materials including infrared missiles. Complete development [ ] Initiate system definition. [ ] Update [ ] Initiate update [ ] Update. [ ] Continue improvements to missile model simulation and data reduction/data analysis. Initiate development [ ]

Program Element: 64255N Title: Air Electronic Warfare
DoD Mission Area: 374 - Multimission, Technology & Support Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue development [ ] Continue improvements to missile model simulation and data reduction/data analysis. Continue improvements to fixed point test site, tactical environment simulators and technical support to COMOPTEVFOR. Continue [ ] Continue exploitation of foreign ground and seaborne threat materials.

4. (U) FY 1984 Planned Program: Continue development of [ ] Continue update of [ ] Continue improvements to missile model simulations and data reduction/data analysis. Continue improvements to fixed point test site; tactical environment simulations and technical support to COMOPTEVFOR. Continue [ ] Continue exploitation of foreign ground and seaborne threat materials.

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

6. (U) Milestones: Not applicable.

Project: W0602 Title: Electronic Warfare Environmental Simulation
Program Element: 64255N Title: Air Electronic Warfare
DoD Mission Area: 374 - Multimission, Technology & Support Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Enemy radar/missile surface-to-air defense systems have exacted a high cost in U.S. aircraft and pilots. This program's purpose is the development of Electronic Warfare Environment Simulators to replicate enemy threat characteristics and operational parameters and thereby enhance mission success by enabling aircrews to visualize and experience the threat prior to combat exposure. The simulations will provide a realistic enemy surface-to-air (sea & land) environment of electronic weapon and weapon guidance systems to test, evaluate and develop tactics for our airborne electronic countermeasures systems and devices. Prototype equipments and proposed system changes will also be evaluated for effectiveness.

(U) RELATED ACTIVITIES: Related effort with U.S. Air Force and U.S. Army is coordinated through the Tri-Service CROSSBOW-S Project, the Joint Coordinating Committee on Electronic Defense Systems, and the mutual use of facilities.

(U) WORK PERFORMED BY: In-house: Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA. Contractors: SWL Inc., McLean, VA; Applied Physics Laboratory/Johns Hopkins University, Silver Spring, MD; Texas Instruments, Inyokern, CA; Radio Corporation of America, Moorestown, NJ: Flight Services Inc., Inyokern, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project originated in August 1967. Interim land based system was operational in the first quarter of FY 1969. Advanced land based system was operational in March 1971. First U.S. simulation was operational in September 1971. First simulation was operational in September 1972. Exploitation of was initiated in early FY 1973. Actual operational in September 1972. Second operational was available in December 1972. Naval Weapons Center, China Lake) was operational in May 1977 development was completed in September 1978. Integration was initiated in FY 1979. Continued Electronic Counter-Countermeasures and instrumentation updates. Completed design definition of Continued Electronic Warfare tactics development. Continued development with Air Force. Initiated Continued

2. (U) FY 1982 Program: Complete development Initiate system definition Update analysis. Initiate development of Initiate update of Continue improvements to missile model simulators and data reduction/data Complete emitter simulator development. Continue

Project: W0602
Program Element: 64255N
DoD Mission Area: 374 - Multimission, Technology & Support

Title: Electronic Warfare Environmental Simulation
Title: Air Electronic Warfare
Budget Activity: 4-Tactical Programs

3. (U) FY 1983 Planned Program: Continue development of [redacted] Continue improvements to missile model simulations and data reduction/data analyses. Continue improvements to fixed point test site, tactical environment simulators and technical support to COMOPTEVFOR. Continue [redacted] Initiate development of [redacted]

4. (U) FY 1984 Planned Program: Continue development of [redacted] simulations. Continue update of [redacted] Continue improvements to missile model simulations and data reduction/data analysis. Continue improvements to fixed point test site, tactical environment simulations and technical support to COMOPTEVFOR. Continue [redacted]

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
W0602	Electronic Warfare Environmental Simulation	8,629	9,714	11,125	14,531	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64260N
Title: CH-53E
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	8,006	10,941	11,201	7,904	492	48,785
W1109	CH/MH-53	8,006	10,941	11,201	7,904	492	48,785
	(Quantity)	(T&E)					(2)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will provide a dual-mission aircraft kit (Airborne Mine Countermeasures and logisitics support) for USN H-53E helicopters. MH-53E is the designation of CH-53E helicopters configured to conduct Airborne Mine Countermeasures (AMCM) operations by towing mine countermeasure equipment to sweep or neutralize sea mines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 request is to continue the development of an Airborne Mine Countermeasures capability for the H-53E helicopter. The cost increase between FY 1982 and FY 1983 was caused by program restructuring and concomitant cost escalation engendered by $11.4 million Navy reprogramming in FY 1979, 1980 and 1981. 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 decrease of $6,072 in FY 1981 was due to Navy reprogramming. The decrease in FY 1982 of $353 is the result of reduction in the inflation index. The increase of $1,197 in FY 1983 is a result of restructuring the program as a result of earlier reprogramming actions. The decrease in the Total Estimated Cost (-$333) is the result of Navy reprogramming actions.

(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	9,910	14,678	11,294	10,004	2,901	49,312
W1109	CH/MH-53	9,716	14,678	11,294	10,004	2,901	49,118
W0506	CH-53E Helo System	194	0	0	0	0	194

(U) OTHER APPROPRIATION FUNDS: To be determined.

Program Element: 64260N
Title: CH-53E
DoD Mission Area: 234 - Mine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The MH-53E is the designation of the CH-53E aircraft configured to conduct Airborne Mine Countermeasures operations by towing Airborne Mine Countermeasures equipment to counter sea mines. The three engined MH-53E with a gross weight of 73,500 pounds will have the required tow tension, endurance, and lift capacity to employ fully all Airborne Mine Countermeasures equipment now in fleet use and under development. The MH-53E will have a night towing capability, a greater safety margin while towing, and an improved reliability and maintainability over the present Airborne Mine Countermeasures helicopter, the RH-53D. This program will provide a dual mission aircraft that will yield an increased Airborne Mine Countermeasures inventory to counter sea mines, as well as the ability to perform the mission of logistics support.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: Sikorsky Aircraft, Division of United Technologies, Stratford, CT. Naval Air Development Center, Warminster, PA; Naval Air Test Center, Patuxent River, MD; Naval Coastal Systems Center, Panama City, FL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The development program was started in FY 1979 with a preliminary design analysis which initiated detailed specifications for development of the kit for the Airborne Mine Countermeasures MH-53E. FY 1980 and 1981 completed detail specification for development of the kit for the airborne mine countermeasures MH-53E. Request for proposal was issued and contractors proposal for prototype aircraft development and testing was received.

2. (U) FY 1982 Program: Award development contract. Complete engineering design and start fabrication of airborne mine countermeasures kit for testing on one H-53E aircraft. Start engineering feasibility analysis of improved life tail rotor system.

3. (U) FY 1983 Planned Program: Complete prototype aircraft modification. Initiate development of improved life tail rotor.

4. (U) FY 1984 Planned Program: Complete contractor prototype flight tests. Initiate development of night vision and OMEGA long range navigation system.

5. (U) Program to Completion: FY 1985: Complete Navy Technical Evaluation followed by operational testing; obtain Approval for Service Use. FY 1986: Qualify tail rotor. FY 1987: Qualify night vision system. FY 1988: Obtain approval for service use for night vision system.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64261N
Title: Acoustic Search Sensors (Engineering)
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	19,344	18,121	14,600	4,801	Continuing	Continuing
W0478	Expendable, Reliable Acoustic Path Sonobuoy	9,828	4,818	8,428	3,913	12,284	62,343
	Quantities			(D/OT&E)	(D/OT&E)		(390)
W0479	Advanced Sonobuoy Communications Link	610	0	0	0	0	18,754
W0480	Passive Advanced Sonobuoy	2,059	7,020	2,624	TBD	TBD	TBD
W0492	Automatic Detection/Computer Aided Classification	1,444	1,406	250	0	0	4,489
W0495	Dwarf Sonobuoy	1,534	2,225	2,13[illegible]	0	0	9,820
	Quantities					(D/OT&E)	(304)
W1102	Passive Doppler Tracking	3,869	2,652	1,162	888	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the engineering development of acoustic search sensors to (1) ensure a search capability against the quiet submarine threat of the 1980s and 1990s, (2) improve cost and operational effectiveness, (3) improve logistics support, (4) ensure compatibility with airborne avionics, and (5) assist with software integration.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 request provides for the continuation of engineering development model contracts on the various projects within the program element. For Expendable, Reliable Acoustic Path Sonobuoy, conduct contract initial air drop development and Navy design approval tests, continue development of software for the Advanced Signal Processor. The increase in funds from FY 1982 to FY 1983 reflects the acquisition of 300 sonobuoys required for air drop testing, Navy test and evaluation, and continued development of software for advanced signal processor. For Dwarf Sonobuoy, complete Directional Frequency Analysis and Recording sonobuoy Operational Evaluation. Continue Passive Advanced Sonobuoy Project qualification for air launch from all anti-submarine warfare aircraft of an improved Vertical Line Directional Frequency Analysis and Recording Sonobuoy. The decrease in funding from FY 1982 to FY 1983 reflects the project restructure due to late award of FY 1981 contract. Improve acoustic detection and classification capability in the Automatic Detection/Computer Aided Classification and passive

Program Element: 64261N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Engineering)
Budget Activity: 4 - Tactical Programs

tracking algorithms (Passive Doppler Tracking). 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 in funding as shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary reflects decreases of $400 in FY 1981, $823 in FY 1982 and $546 in FY 1983 for a total decrease of $1769 resulting from deescalation (978), Navy application of reductions for consultant support (236) and overall Navy budget adjustments (555).

(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	12,917	19,744	18,944	15,146	Continuing	Continuing
W0478	Expendable, Reliable Acoustic Path Sonobuoy	6,700	9,981	4,934	8,735	Continuing	Continuing
W0479	Advanced Sonobuoy Communications Link	2,417	0	0	0	0	18,144
W0480	Passive Advanced Sonobuoy	2,400	2,177	7,217	2,716	Continuing	Continuing
W0492	Automatic Detection/Computer Aided Classification	1,400	1,456	1,445	258	Continuing	Continuing
W0495	Dwarf Sonobuoy	*	2,227	2,437	2,236	0	10,825
W1102	Passive Doppler Tracking	**	3,903	2,911	1,201	Continuing	Continuing

* Previously funded in program element 63259N, Acoustic Search Sensors (Advanced).
** Previously funded in program element 64219N, Airborne Anti-Submarine Warfare Developments.

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 64261N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The following projects are funded in this element. PROJECT W0478, EXPENDABLE, RELIABLE ACOUSTIC PATH SONOBUOY - This sonobuoy is a long range active search sensor for use by anti-submarine warfare aircraft. It is designed to utilize the long range direct propagation mode known as the reliable acoustic path. It provides the air anti-submarine warfare forces the option to actively search for a submarine that is undetectable by passive acoustic sensors. The active detection ranges will be significantly greater than those experienced with today's active sonobuoys. The sonobuoy is deployed [ ] The detection is gained by using a low frequency, high power transmitted pulse and a volumetric receiving array. Range, bearing and doppler are provided. To perform required tests, 75 engineering development models and 315 service test models for Navy technical evaluation/initial operational test and evaluation are required to obtain service approval. PROJECT W0479, ADVANCED SONOBUOY COMMUNICATIONS LINK - Provides for the development of a sonobuoy-to-aircraft communication link that is capable of conveying large amounts of data over more channels at greater ranges than the current systems. The Advanced Sonobuoy Communications Link system consists of an aircraft receiver and adaptive antenna. The aircraft receiver, which is compatible with current and future sonobuoys, will increase the number of radio frequency channels from the current[ ] The adaptive antenna, which may be manually or computer controlled, will increase the radio frequency range[ ] and will enable the operator to null out sources of jamming. The Advanced Sonobuoy Communications Link system was integrated into the P-3C aircraft as part of the P-3C Update III and P-3 Modernization programs and will be integrated into the S-3A (receiver only) as part of the Weapon System Improvement Program. This system will be compatible with all air anti-submarine warfare platforms. PROJECT W0480, PASSIVE ADVANCED SONOBUOY - The Passive Advanced Sonobuoy program provides for the development of an improved passive sensor to combat the emerging Soviet submarine threat. Project effort has been redirected to Vertical Line Array Directional Frequency Analysis And Recording II sonobuoy, which is designed to have improved acoustic performance to include[ ] convergence zone capability which selected from the experimental steered Vertical Line Array. PROJECT W0492, AUTOMATIC DETECTION/COMPUTER AIDED CLASSIFICATION - This provides for increased assistance, vis-a-vis current algorithms, to the operators of anti-submarine warfare platforms[ ] This project will take advanced development software systems and integrate them with fleet operational systems through an orderly engineering development program. PROJECT W0495, DWARF SONOBUOY - Improved sonobuoy storage, handling, logistics, and cost-reduction are all attributes of the Dwarf Sonobuoy project. Other projects presently address developments aimed at incorporating enhanced acoustic performance within standard package dimensions. The Dwarf Sonobuoy project increases anti-submarine warfare effectiveness by reducing package size and weight of both current production and developmental sonobuoys, while maintaining at least equal performance, and physical compatibility with aircraft launching systems. Weight and volume reduction will decrease storage, handling and logistics costs both ashore and shipboard thereby reducing the mission cost per anti-submarine warfare sortie. The Dwarf Sonobuoy will also increase capability with today's systems, and complement advanced systems under development by permitting greater numbers of stores to be carried per sortie. Dwarf Sonobuoy will incorporate, as appropriate, certain technological advances such as improved hydrophone suspensions and low frequency performance, radio frequency channel synthesizers, remote function selection, and improved decelerator (consistent with the objective of achieving reduced unit cost compared with standard packaging). Dwarf Sonobuoy will be an essential contribution to effective shallow water anti-submarine warfare capability where relatively large numbers of sensors will generally be required.

Program Element: 64261N
Title: Acoustic Search Sensors (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

To perform required tests, 304 engineering development models will be procured for non-technical (84) and operational (220) testing. PROJECT W1102, PASSIVE DOPPLER TRACKING - Provides air anti-submarine warfare platforms with the capability to accurately track and localize submarines with data (from passive acoustic sensors) utilizing inter-sonobuoy doppler phenomenon. This program will result in more rapid localization and more accurate attack fix position thereby increasing the probability of kill.

(U) RELATED ACTIVITIES: Program Element 64219N, Project W0484, Anti-Submarine Warfare Avionics Improvements, integrated the Advanced Signal Processor, Advanced Sonobuoy Communications Link, AQH-4(V)2 tape recorders and other new avionic systems into the P-3C series aircraft (this new avionics suite will be capable of processing all current and future sonobuoys such as Expendable, Reliable Acoustic Path Sonobuoy and Passive Advanced Sonobuoy). Other related efforts are in Program Element 63259N, Acoustic Search Sensors (Advanced development of acoustic search sensors); Program Element 62711N, Undersea Target Surveillance; and Program Element 63708N, Advanced Acoustic Processing (detection algorithm development). Program Element 64217N, S-3 Weapon System Improvements S-3( ) and Program Element 64212N, Light Airborne Multi-Purpose System MK III will also employ sensors developed in this program element.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Ocean Systems Center, San Diego, CA; and Naval Avionics Center, Indianapolis, IN. Contractors: Bunker-Ramo Corporation, Westlake Village, CA; Magnavox Corporation, Fort Wayne, IN; Hazeltine Corporation, Braintree, MA and Long Island, NY; Sanders Associates, Nashua, NH; Spartan Corporation, Jackson, MI; IBM, Owego, NY; IBM, Manassas, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The feasibility of using the reliable acoustic path propagation mode for long range detection was proven in tests conducted in the Atlantic and Pacific Oceans and Mediterranean Sea. The results of the advanced development model contract have demonstrated that the Expendable, Reliable Acoustic Path Sonobuoy can be built using sonobuoy components and can provide the required detection performance. Full scale development commenced in FY 1980 with the engineering development contract awarded in December 1979. The development of the software specifications for the Advanced Signal Processor was started in FY 1979, software programming was initiated in FY 1980, and the first processing function was completed in FY 1981. Initial critical air and sea tests were initiated in FY 1981. Conducted feasibility studies and contracted for the advanced development model and engineering development phase of the Advanced Sonobuoy Communications Link aircraft receiver and adaptive antenna. This project was restructured in FY 1980 to include designs for other aircraft applications (S-3A, SH-60B). Conducted a preliminary operational evaluation of the Advanced Sonobuoy Communications Link advanced development model hardware. In FY 1980, completed P-3C Advanced Sonobuoy Communications Link development in preparation for testing. In FY 1981 commenced design/implementation of an improved Multi-Platform Common Receiver Module and successfully completed Navy Test and Evaluation as

Program Element: 64261N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Engineering)
Budget Activity: 4 - Tactical Programs

part of the P-3C program. Performed trade-off analysis, design studies and performance predictions for the Passive Advanced Sonobuoy program. Completed acoustic array design trade-off analyses, design studies and performance predictions. Developed a baseline design specification and statement of work for contract action of a Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy. Contracted for the engineeering development phase of the Passive Advanced Sonobuoy. Developed and successfully tested prototype Dwarf Sonobuoy and launch tube inserts, Directional Frequency Analysis and Recording sonobuoy aero-mechanical models, hydrophones and suspensions, and shipping launch container. Commenced deliveries of initial engineering development models for Navy testing. Automatic Detection/Computer Aided Classification. Restructured and restarted the Machine Assisted Detection and Classification project previously terminated in FY 1978 in lieu of higher priority project shortfalls. Program was restructured to take advantage of algorithms developed in program element 63708N (Anti-Submarine Warfare Signal Processing). Began Advanced Development of the algorithms for AN/AQA-7 and Advanced Signal Processor. The Passive Doppler Tracking algorithms were all selected and optimized. Algorithm validation/test began and performance was demonstrated in P-3 aircraft.

2. (U) FY 1982 Program: The engineering development model contract and buoy testing will continue. Air mechanical deployment sea tests for Expendable, Reliable Acoustic Path Sonobuoy will be completed. Work will be initiated on the development of the acoustic prediction model to be used by the Fleet Numerical Weather Center once the Expendable, Reliable Acoustic Path Sonobuoy is in operational use. Software development for the Advanced Signal Processor will continue. Continue the Passive Advanced Sonobuoy (Vertical Line Array Directional Frequency Analysis and Recording II) engineering development contract. Complete Dwarf (Directional Frequency Analysis and Recording) Sonobuoy engineering model development and test. Complete preproduction deliveries and conduct operational testing and multi-platform flight certification tests. Passive Doppler Tracking will continue development, algorithm validation and performance demonstration with aircraft application. Software development will begin for the AN/AQA-7, AN/AYK-14 and AN/UYS-1. Automatic Detection/Computer Aided Classification will complete AN/AQA-7 and AN/UYS-1 software and documentation.

3. (U) FY 1983 Planned Program: The Expendable, Reliable Acoustic Path Sonobuoy air acoustic tests will be conducted, the design approval tests will commence, the Advanced Signal Processor software program will continue and the shipping/storage container development will be initiated. Dwarf Sonobuoy project will complete operational evaluation and achieve approval for service use for the Directional Frequency Analysis and Recording sonobuoy. Continue with Vertical Line Array Directional Frequency Analysis and Recording II engineering development model (Passive Advanced Sonobuoy); start Phase II of engineering development model. Complete laboratory demonstrations of Automatic Detection/Computer Aided Classification software algorithms for use with current P-3C and S-3A aircraft acoustic signal processors. Continue development of [redacted] methods programmed in the advanced computer language of the P-3C Update series aircraft. Commence development of advanced detection and classification algorithms for the S-3 Weapon System Improvement Program and the SH-60B program. Passive Doppler Tracking will complete applications software for P-3C, S-3A and SH-60B.

Program Element: 64261N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Acoustic Search Sensors (Engineering)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Contractor demonstration tests of the Expendable, Reliable Acoustic Path Sonobuoy will be conducted and design approval tests completed. The Navy technical and operational evaluation buoy contract will be awarded. Program peculiar Advanced Signal Processor software will be laboratory tested. Initial testing of the acoustic prediction software will be completed using data from prior tests. Continue Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy developments in the Passive Advanced Sonobuoy Program and begin Navy Technical Evaluation. Passive Doppler Tracking will complete operational software development as part of the Advanced Signal Processor (Major System Mode-11) in Program Element 64266N.

5. (U) Program to Completion: This is a continuing program which will complete engineering development of those new acoustic sensors which satisfactorily transition from the advanced development stage. The Navy technical evaluation of the Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy will be completed in FY 1985 with an Initial Operational Capability planned Navy Technical Evaluation of the Expendable, Reliable Acoustic Path Sonobuoy will be completed in FY 1985. Provisional Approval for Service Use is scheduled for FY 1985; first article testing will occur in FY 1986. Initial operational test and evaluation will be conducted in FY 1987 with approval for service use by October 1988.

6. (U) Milestones: Not applicable.

Project: W0478 — Title: Expendable, Reliable Acoustic Path Sonobuoy
Program Element: 64261N — Title: Acoustic Search Sensors (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for the development of an Expendable, Reliable Acoustic Path Sonobuoy. This sonobuoy is a long range active search sensor for use by anti-submarine warfare aircraft. It is designed to utilize the long range propagation mode known as the reliable acoustic path. It provides the air anti-submarine warfare forces the capability to actively search for a submarine that is undetectable by passive acoustic sensors. The active detection ranges will be significantly greater than those experienced with today's active sonobuoys. The sonobuoy is deployed [redacted] The detection is gained by using a low frequency, high power transmitted pulse and a volumetric receiving array. Range, bearing and doppler are provided. Due to the sonobuoy's complexity, 75 engineering development models and 315 service test models will be required for Navy technical evaluation/initial operational test and evaluation.

(U) RELATED ACTIVITIES: Program Element 64261N, Acoustic Search Sensors (Engineering) project W0479, Advanced Sonobuoy Communication Link. This project is developing a sonobuoy communication link that is compatible with the acoustic sensor.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Weapons Support Center, Crane, IN; Naval Ocean Systems Center, San Diego, CA; Naval Avionics Center, Indianapolis, IN. Contractor: Bunker-Ramo Corporation, Westlake Village, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The feasibility of using the reliable acoustic path propagation mode for long range active detection was proven in tests conducted in the Atlantic and Pacific Oceans and Mediterranean Sea. The results of the advanced development model contract have demonstrated that the Expendable, Reliable Acoustic Path Sonobuoy can be built to provide the required detection performance. Full scale development commenced in 1980 with the Engineering Development Model contract awarded in December 1979. The development of the software specifications for the Advanced Signal Processor was started in FY 1979, software programming was initiated in FY 1980, and the first processing mode was completed in FY 1981. Module Designs were completed and tests begun in FY 1981; over-the-side tests began in FY 1981; flight clearance was obtained and initial flights conducted in FY 1981. A display format optimization system was devised and software begun.

2. (U) FY 1982 Program: The Engineering Development Model contract and buoy testing will continue. Air mechanical, deployment, and over-the-side tests for the Expendable, Reliable Acoustic Path Sonobuoy will be completed. Work will be initiated on the development of the Acoustic Prediction Model to be used by the Fleet Numerical Weather Center once the Expendable, Reliable Acoustic Path Sonobuoy is in operational use. Software development for the the Advanced Signal Processor will continue.

Project: W0478 — Title: Expendable, Reliable Acoustic Path Sonobuoy
Program Element: 64261N — Title: Acoustic Search Sensors (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare — Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: The Air Acoustic tests will be completed. The design approval tests will commence, development of the Advanced Signal Processor software program will continue, and the shipping/storage container development will be initiated.

4. (U) FY 1984 Planned Program: Contractor demonstration tests will be conducted and design aporoval tests completed. The Navy technical and operational evaluation buoy contract for 315 models will be awarded. Program peculiar Advanced Signal Processor software will be laboratory tested. Initial testing of acoustic prediction software will be done using data from prior tests.

5. (U) Program to Completion: Navy Technical Evaluation will be completed in FY 1985; first article testing will occur in FY 1986. Initial Operational Test and Evaluation will be conducted in FY 1987 with production beginning in FY 1988.

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
W0478	Expendable, Reliable Acoustic Path Sonobuoy	9,828	4,818	8,428	3,913	12,284	62,343

Project: W0480
Program Element: 64261N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Passive Advanced Sonobuoy
Title: Acoustic Search Sensors (Engineering)
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Passive Advanced Sonobuoy is under development to provide the principal airborne passive sensor to counter the projected future submarine threat. The project is planned to provide both open-ocean and shallow-water search capabilities and includes the analysis of environmental measures, design studies, critical component investigations, operations analysis and sensor comparisons.

(U) Deep Water Search Sensor: A sensor will be developed for deep water search that is capable of employment [ ]. Candidates considered in exploratory development were: On-the-Bottom Directional Frequency Analysis Recording, Horizontal Planar Array, Volumetric Arrays, Horizontal Linear Arrays and Vertical Line Array. The candidate chosen for advanced development was the Steered Vertical Line Array sonobuoy. The Steered Vertical Line Array sonobuoy was to be an A-size sonobuoy employing a [ ] hydrophone array to [ ]. Data analyses (both theoretical and empirical) raised cost-effectiveness questions concerning the performance gain of the Steered Vertical Line Array sonobuoy over the Vertical Line Array Directional Frequency Analysis and Recording sonobuoy given the higher cost and more demanding processor requirements. This concern has led the Navy to emphasize the development of Vertical Line Array Directional Frequency Analysis and Recording sonobuoy variants.

(U) RELATED ACTIVITIES: Work done in the Passive Advanced Sonobuoy project is related to other activities in Program Element 64261N, Acoustic Search Sensors (Engineering).

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Surface Weapons Center, White Oak, Silver Spring, MD. Contractor: Hazeltine Corporation, Braintree, MA; Magnavox Corporation, Fort Wayne, IN; Spartan Corporation, Jackson, MI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The original sensor planned to combat improved Soviet submarines was the Multi-element Array Passive Sonobuoy. This development was initiated in FY 1970, but due to concern over the high projected production costs, inability to package in an "A" size sonobuoy and some extensive technical problems, the development was terminated in FY 1973. The program nomenclature was changed from Multi-element Array Passive Sonobuoy to Passive Advanced Sonobuoy developing the Steered Vertical Line Array sonobuoy as the primary candidate. The Passive Advanced Sonobuoy program also includes a measurements program to obtain data for future sonobuoy development. In FY 1974, the program was limited to the procurement of a design and performance study for the Steered Vertical Line Array sonobuoy and continuation of the Vertical Line Array Measurements data analysis. During FY 1975, the advanced development model contract for the Steered Vertical Line Array sonobuoy was initiated, a major array-at-sea measurement test was conducted, and study/analyses efforts continued in the areas of operational analysis, design and performance predictions, as well as [ ] requirements for non-Advanced Signal Processor aircraft. During FY 1976-FY 1977, the advanced

Project: W0480 Title: Passive Advanced Sonobuoy
Program Element: 64261N Title: Acoustic Search Sensors (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4-Tactical Programs

development model contract for the Steered Vertical Line Array sonobuoy was continued as well as the open ocean data gathering program with the Test Steered Vertical Line Array. During FY 1978 the Test Steered Vertical Line Array data analysis was continued examining bearing/range-ring performance, vertical noise directionality, array correlation and array gain. An analysis of advanced sonobuoy options was conducted examining feasibility of in-sonobouy [ ] (and cost-effectiveness), and an operational analysis consisting of field performance and time sharing studies was conducted. The performance of Steered Vertical Line Array sonobuoy over Vertical Line Array Directional Frequency Analysis and Recording sonobuoy did not warrant the higher costs and more demanding processor requirements. (This is periodically reviewed in program element 63259N, Advanced Passive Sensors, dependent upon threat submarine projected sound source level). Therefore, the FY 1979 effort was directed to a Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy, a buoy with improved [ ] acoustic performance and with convergence zone capability which is a more cost-effective counter to the existing threat. In FY 1980, a baseline design was developed. In FY 1981, two parallel contracts were negotiated for Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy engineering development hardware to improve [ ] gain, enhance convergence zone capability and include [ ] radio frequency channels.

2. (U) FY 1982 Program: Continue Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy development of critical components. Examine commandable and long life features in the development effort. Field sampling tests for long life and commandable features previously conducted in Program Element 63259N, Acoustic Search Sensors (Advanced).

3. (U) FY 1983 Planned Program: Commence second phase of development and contractor demonstration tests of engineering development model.

4. (U) FY 1984 Planned Program: Commence Navy technical evaluation testing.

5. (U) Program to Completion: Complete Navy technical evaluation with an operational evaluation planned for FY 1985. Continue Vertical Line Array Directional Frequency Analysis and Recording II sonobuoy development to achieve an initial operational capability [ ]

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
W0480	Passive Advanced Sonobuoy	2,059	7,020	2,624	TBD	TBD	TBD

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 642625
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Title: Marine Medium Assault Transport (V/HXM)
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	9,522	24,094	TBD	TBD
41425	Joint Advanced Vertical Lift Aircraft (JVX)	0	0	9,522	24,094	TBD	TBD
	Quantity (Operational Test and Evaluation)						(2)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED:

This aircraft will also serve in the Navy Combat Search and Rescue Role. The HXM requirement, as stated in the approved Mission Element Needs Statement of 7 January 1981, will be pursued through a joint program led by the Army and will utilize advanced technology.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The above funding profile appears as V/HXM in the Navy FYDP and is intended as the initial committment of Navy funds to the joint program.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: Not applicable. This program not funded in FY 1982.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not applicable.

(U) OTHER APPROPRIATION FUNDS: To be determined.

Program Element: 64262N Title: Marine Medium Assault Transport (V/EXP)
DoD Mission Area: 232 - Amphibious, Strike, Anti Surface Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The U.S. Marine Corps has an outstanding requirement to replace the CH-46E and CH-53A/D for medium assault lift and the Navy requires a Combat Search and Rescue Vehicle. This aircraft will be an advanced technology air vehicle developed in a joint program led by the Army.

- This program will provide an advance technology air vehicle with an Initial Operational Capability (IOC).

(U) RELATED ACTIVITIES: Army led program for a joint Vertical Lift Aircraft (JVX).

(U) WORK PERFORMED BY: In House: Naval Air Systems Command, Washington, DC. Naval Air Development Center, Warminster, PA. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

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

2. (U) FY 1982 Program: Complete Joint Technical Assessment, Joint Statement of Requirements (JSOR) and an MOU/MOA to further define the extent of involvement and responsibility of the services.

3. (U) FY 1983 Planned Program: Complete source selection. Proceed to DSARC I/II, award full scale development contract.

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

5. (U) Program to Completion: Complete development, conduct technical and operational testing, commence production/procurement.

6. (U) Milestones:

Milestone II	FY 1983
Initial Operational Capability	

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64263N
Title: F/A-18 Naval Strike Fighter
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	170,856	190,000	109,224	0*	TBD	TBD
W0625	F/A-18	170,856	190,000	109,224	0*	TBD	TBD

*Continues in PE 24136N

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The F/A-18 Naval Strike Fighter is a twin engine, mid-wing, multi-mission tactical aircraft. The F/A-18 will be employed in both Navy and Marine Corps fighter and attack squadrons. Tactical reconnaissance and two-seat trainer versions are also planned. The F/A-18 is missionized in fighter and attack squadrons through selected use of external equipment to accomplish specific fighter or attack missions. Commonality provides several benefits. Any aircraft can quickly be configured to perform either fighter or attack missions, as needed, offering the Operational Commander more flexibility in employing his tactical aircraft in a changing scenario. The primary design mission for the fighter applications is fighter escort with fleet air defense as a complementary mission. The attack missions are interdiction and close air support. Since the attack squadrons fly the same airframe, engine, and flight control system as the fighter squadrons, they will have excellent fighter and self-defense capability. 1366 aircraft are scheduled for production.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The funds requested will continue the development, test and evaluation of the F/A-18 aircraft. Deficiencies resulting from the FY 1982 Operational Evaluation for the fighter and attack missions and Board of Inspection and Survey trials will be corrected. The full-scale engineering development effort will be completed and the contract closed. Defense Systems Acquisition Review Council III (attack) will be held in the fall of 1982. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1983.

(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 -1,900 in FY 1981 was due to reprogramming. The increase of +16,688 in FY 1982 reflects efforts to enhance the aircraft's maneuverability and survivability (Roll Rate Mod), to incorporate the weight reduction program and to provide for additional weapon capabilities (Laser Target Designator/Laser Ranger). The increase of +33,207 in FY 1983 offsets an equal unfunded amount in FY 1982 due to a Congressional reduction in FY 1982.

Program Element: 64263N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: F/A-18 Naval Strike Fighter
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	310,298	172,756	173,312	76,017	TBD	TBD
W0625	F/A-18	310,298	172,756	173,312	76,017	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 Funds	2,012,300	2,420,800	2,847,400	2,858,500	TBD	TBD
Quantity	60	63	84	96	TBD	TBD
MILCON	400	12,850	5,600	11,250	20,100	57,400

Program Element: 64263N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: F/A-18 Naval Strike Fighter
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The F/A-18 Naval Strike Fighter is a twin-engine, mid-wing, multi-mission, tactical aircraft. Two mission applications of the F/A-18, fighter and attack, will be employed to replace the F-4 and A-7 aircraft. A tactical reconnaissance version is planned. The F/A-18 is missionized in fighter and attack squadrons through selected use of external equipment to perform either fighter or attack missions. Commonality provides several benefits. Each aircraft can quickly be configured to perform the other's mission if needed, offering the operational commander more flexibility in employing his tactical aircraft in a changing scenario. All F/A-18 aircraft have low drag SIDEWINDER and SPARROW installations, an internally mounted 20mm gun, and electronic flight controls with mechanical backup. In addition to these capabilities, the aircraft can be rapidly configured to carry the High Speed Anti-Radiation Missile (XAGM-88), MAVERICK (AGM-76), WALLEYE, forward looking infrared, laser spot tracker and strike camera. The primary design mission for the fighter applications is fighter escort with fleet air defense as a complementary mission. The attack missions are interdiction and close air support. Since the attack squadrons fly the same airframe, engine and flight control system as the fighter squadrons, they will also have inherent fighter and self-defense capability. Approximately 100 of the 1366 production aircraft will be two seat aircraft. The Naval Air Systems Command's "new look" in reliability has been implemented for the first time in the F/A-18 program and is designed to achieve significant improvements in fleet readiness and to reduce total cost of ownership. This emphasis on "designing in" reliability includes reliability guidelines derived from NASA studies, and a formal component reliability development program including the Test, Analyze and Fix discipline, as well as realistic reliability qualification testing in the form of Operational Mission Environment requirements on selected critical subsystems. An integrated test plan and formal design reviews ensure maximum government visibility and confidence in the achievement of reliability and maintainability requirements.

(U) RELATED ACTIVITIES: Program Element (PE) 69235F, US Air Force Combat Fighter Project, Project 1225, ACF.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Air Engineering Center, Lakehurst, NJ; Naval Air Propulsion Center, Trenton, NJ; Naval Ordnance Station, Indian Head, MD; Naval Weapons Center, China Lake, CA; Naval Weapons Engineering Support Activity, Washington, DC; Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD. Contractors: McDonnell-Douglas Corporation, St. Louis, MO (Airframe and Weapon System Integration); General Electric Company, Lynn, MA (F-404 Engine); Hughes Aircraft Company, Culver City, CA (Radar subcontractor to McDonnell); Northrop Aircraft Division, Hawthorne, CA (Center/aft fuselage subcontractor to McDonnell).

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: On 10 and 30 December 1976, the Navy signed definitized contracts with the General Electric Company for the F-404-400 GE engine and with the McDonnell Douglas Aircraft Company for full-scale development of the F/A-18 Naval Strike Fighter. The first engine began development testing on 5 January 1977, one month ahead of schedule. Since that time, 13 additional engines have begun testing, including altitude performance testing at the Naval Air Propulsion Center, Trenton, New Jersey. Engine cost and schedule are within established development parameters. The critical and final design

Program Element: 64263N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: F/A-18 Naval Strike Fighter
Budget Activity: 4 - Tactical Programs

reviews for the F/A-18 were completed at McDonnell in April and November 1977, respectively. All milestones leading to release of inicial production funds, including an Office of the Secretary of Defense Defense Systems Acquisition Review Council III (fighter) review, have been satisfactorily completed. Life cycle Costs have been addressed during design and development through intensive reliability and maintainability efforts. Reliability and maintainability continues to receive highest priority and achievement will be verified through test and evaluation prior to final release of funds for full rate production. Operational Mission Environment reliability testing has been required on key subsystems and is in process. A Radar Test Bed flight test program began in February 1978. One hundred forty-nine (149) flights, including a successful Navy Preliminary Assessment, were completed, and the test bed is continuing in development. The F/A-18 flight test program was initiated with first flight occurring on 18 November 1978. Eleven Full Scale Development aircraft have been delivered and have accumulated 4611.0 flight hours as of 4 January 1982. During FY 1979 the first Navy Preliminary Evaluation of the F/A-18 (fighter configuration) was conducted and the F-404 engine Qualification Testing was completed. Mission Element Need Statement has been approved in conjunction with revised Decision Coordinating Paper. During FY 1980 the Initial Sea Trials, Navy Preliminary Evaluation II, and Navy Preliminary Evaluation III were completed. Navy Preliminary Evaluation IV was completed during Oct 1980. The last significant development milestone, the Simulated Mission Endurance Test, was successfully completed in August 1980. Fourteen production airplanes have been delivered and 1782.6 flight hours have been realized on the production planes by fleet pilots.

2. (U) FY 1982 Program: A Defense Systems Acquisition Review Council Program Review was held in November 1980 and an OSD Limited Program Review was conducted in March 1981 to review results of Initial Operational Test and Evaluation conducted in October 1980-February 1981. Navy Preliminary Evaluation and Board of Inspection and Survey trials and Operational Evaluation will start during May 1982 with continued effort for expanded F/A-18 capability that will include initial efforts on Joint Service Missile, Non-Cooperative Target Recognition, Radar Warning Receiver, Airborne Self-Protection Jammer, and Two-way Data Link.

3. (U) FY 1983 Planned Program: Defense Systems Acquisition Review Council III (attack) is scheduled for fall 1982. Complete full-scale engineering development with primary emphasis on acteack capabilities. Conduct Board of Inspection and Survey trials and Operational Evaluation. Complete F-404 Engine Accelerated Service Testing. Achieve Initial Operational Capability. Continue concurrent production.

4. (U) FY 1984 Planned Program: This Program Element completes in FY 1983. Follow-on Test and Evaluation will continue, employing fleet representative aircraft in PE 24136N, F/A-18 Squadrons.

5. (U) Program to Completion: Commander Operational Test and Evaluation Force will evaluate the intermediate maintenance capability as the Navy assumes the capability from the contractor at Naval Air Station Lemoore under the Phased Support Plan. Continue Flight Test Program with Follow-on Test and Evaluation. Continue integration of ALR-67 with High Speed Anti-Radiation Missile Command Launch Computer and Harpoon. Continue incorporation of a beacon bombing mode in F/A-18 radar. Continue development of special purpose software based on various techniques such as Target Recognition through Internal Spectral Analysis Techniques and Multi-Frequency Signatures.

Program Element: 64263N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: F/A-18 Naval Strike Fighter
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestones		Date
Release of Presolicitation Notice		Jun 1974
Response to Presolicitation Notice		Jul 1974
Release of Request for Quotation		Oct 1974
Selection of F-18		May 1975
Completed Advanced Engineering Contracts		Aug 1975
Full Scale Development Contract		Nov 1975
Defense Systems Acquisition Review Council II		Dec 1975
Full-Scale Development Contract (McDonnell-Douglas)		Jan 1976
Radar Subcontractor Selection		Aug 1976
F-404 First Engine to Test		Jan 1977
F-404 Preliminary Flight Rating Test (PFRT)		Jun 1978
First Flight		Nov 1978
F-404 Qualification Test (QT) Completion		Jul 1979
Defense Systems Acquisition Review Council IIIA - Redesignated Program Review		Mar 1980
OSD Program Review for Defense Systems Acquisitions Review Council Principals		Apr 1980
Fighter Missions Initial Operational Test and Evaluation		Feb 1981
Defense Systems Acquisitions Review Council Program Review (Fighter)	(Nov 1980)*	Jun 1981
OSD Limited Program Review	(Feb 1981)*	Mar 1981
Defense Systems Acquisitions Review Council Program Review (Attack)	(Feb 1982)*	Fall 1982
Operational Evaluation Completion	(Feb 1982)*	Aug 1982
End Attack Board of Inspection and Survey Trials	(May 1982)*	Jul 1982
OSD Program Review		Sep 1982
Initial Operational Capability		Dec 1982
Navy Support Date		To Be Determined

* Date shown in FY 1982 Descriptive Summary. Change was due to crash of TF-2. The review, rescheduled for February 1981 occurred on 17 March 1981 and confirmed the F/A-18 as a fighter, but the Defense Systems Acquisition Review Council wanted to review cost reduction efforts and scheduled a subsequent review on 18 June 1981. As a result of the 18 June review full production for the F/A-18 fighter was approved and the Defense Systems Acquisition Review Council III (Attack) was scheduled for September 1982.

Program Element: 64253N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: F/A-18 Naval Strike Fighter
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) The F/A-18 program was approved for full scale development at DSARC II in December 1975 with McDonnell Douglas Corporation (MDC) as the contractor for the F/A-18 aircraft and General Electric (GE) for the F404-GE-400 engine. McDonnell Douglas Corporation subcontracted with Northrop and Hughes to build the center and aft fuselage sections and radar (APG-65), respectively. During DSARC II the Navy was also directed to utilize a T-39 flying test bed to support development of the radar and reduce concurrency/risk. The F/A-18 is a multimission airplane designed primarily to perform fighter escort and interdiction tasks, but with secondary capability as a fleet air defense interceptor and close air support airplane. The progressive development of these multimission capabilities established a need for multiple DSARC level reviews to approve progressive increases in production rate. As a part of the DSARC II process in 1975, DSARC III reviews were scheduled as follows:

DSARC IIIA - March 1980
DSARC IIIB - November 1980
DSARC IIIC - January 1982.

During a DSARC-level program review in Nov 1978, completion of the following tests was directed.

(1) Prior to DSARC IIIA
(a) Firing of AIM-7M and AIM-9 missiles at an airborne target.
(b) Radar operation during gun firing.

(2) Prior to DSARC IIIB
(a) Evaluate controls, displays, radar, and fire control systems integration during air-to-surface attack operations.

b. (U) As a result of the DSARC IIIA process, culminating in a DSARC-level review in April 1980, the current DSARC review schedule was promulgated as follows:

DSARC III (Fighter) - September 1980
Limited OT&E Review - February/March 1981
DSARC III (Attack) - February 1982

Program Element: 64263N Title: F/A-18 Naval Strike Fighter
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

As a result of the loss of an aircraft on 8 September 1980, the September DSARC Review was rescheduled and held November 1980. Decisions at the review were:

(1) Change acceleration requirement to Mach 0.8 to 1.2 at 35,000 ft, maximum thrust; goal, 48 seconds; threshold, 56 seconds.

(2) Increase threshold for takeoff gross weight, fighter escort mission, from 35,500 lbs to 36,000 lbs.

(3) Add goals and thresholds for Built-in-Test (BIT) development, completion and BIT false indication rate.

(4) The combination of the 6 November 1980 DSARC review and the February 1981 review will constitute Milestone III (Fighter).

The review originally scheduled for February 1981 occurred on 17 March 1981 and confirmed the F/A-18 as a fighter, but the DSARC wanted to review cost reduction efforts and scheduled another review on 18 June. As a result of the 18 June review, full production for the F/A-18 fighter was approved, and the DSARC III (Attack) was scheduled for September 1982.

c. (U) The laboratory test program revealed some discrepancies that were corrected, and a redesign of the Environmental Control System was implemented to improve the maintainability and producibility of the airplane. Structural and fatigue tests are very comprehensive with major components having been satisfactorily tested to four fatigue lifetimes and 150% of static design limit load. The original milestone for completion of the first lifetime fatigue tests was March 1980. This fatigue test was delayed due to late delivery of the test article and fabrication of the complex test rig required to simulate flight loads through the multimission spectrum of its expected lifetime. Additionally, a fatigue failure in the fuselage (station 453 bulkhead) further delayed this test. The first fatigue lifetime was completed on 30 April 1981.

d. (U) The very successful development of the F404-GE-400 engine has accumulated over 25,000 hours. The tests have been the most comprehensive ever conducted with special mission oriented evaluations, both in the test cell and the airplane. The Preliminary Flight Rating Tests and Military Qualification Tests were completed on schedule. The Simulated Mission Evaluation Test was completed on schedule in July 1980. The engine thrust and specific fuel consumption have been meeting or exceeding specification for most of the operational envelope. Airframe/engine compatibility has been outstanding as evidenced by the demonstration of stall margin far exceeding specification requirement. The primary engine concern was the failure of a low pressure turbine disk that resulted in the loss of an aircraft on 8 September 1980. Analysis of the failure indicates that the primary fracture was in a preproduction low pressure turbine. The production turbines are made of stronger material and have been

cleared for flight with some temporary restrictions on flight time interval between inspections. As a result of cost reduction efforts, the turbine disk material will be replaced with DA Inco 718, which will provide a stronger material at a cost savings of approximately $25,000 per engine.

e. (U) Flight testing of the weapon system began during February 1978 in a modified T-39 radar test bed. Two Navy Preliminary Assessments were performed by Naval Air Test Center (NATC) and Operational Test and Evaluation Force (OPTEVFOR) with good results in the air-to-air mode. Further development was indicated for satisfactory accomplishment of the interdiction mission. Manufacturing difficulties and unanticipated complexities of software integration for the digital flight control system delayed deliveries of the Full Scale Development airplanes an average of approximately two months. The first of eleven Full Scale Development airplanes flew on 18 November 1978. Single site testing was initiated at Naval Air Test Center, Patuxent River, MD on 16 January 1979 with the arrival of the first Full Scale Development airplane. To date, all eleven Full Scale Development and eleven production airplanes have flown.

f. (U) The first Navy Preliminary Evaluation (NPE) occurred during March and June 1979, and the F/A-18 exhibited excellent potential for the fighter escort mission. Potential for the attack interdiction mission was judged to be limited pending improvement of aircraft specific range. Several enhancing characteristics were noted, including smooth flying qualities, quick engine acceleration, and ease of maintainability. Some areas of concern were:

(1) Nosewheel liftoff airspeed - corrected by rudder and stabilator modifications and verified as satisfactory by the Navy.
(2) Excessive throttle friction - corrected by installation of a throttle boost system and verified as satisfactory by the Navy.
(3) Some undesirable flying qualities - most were corrected prior to initial sea trails. Those corrections made prior to initial sea trials have been verified as satisfactory by the Navy.
(4) High fluid temperatures - corrected by addition of fuel/oil heat exhanger and verified by the Navy.
(5) Acceleration time and specific range - see subparagraphs j(3) and j(4).

g. (U) Navy Preliminary Evaluation II began on 1 October 1979 with a day and night evaluation of a fully integrated weapons system in an F/A-18. The APG-65 Radar, Inertial Navigation, and cockpit displays integration demonstrated excellent potential to perform those missions for which it was designed. Most air-to-air and some air-to-ground modes were available for evaluation. Pilots' comments indicate good potential for one man operability in this multimission design. All other comments were relatively minor and oriented primarily toward symbology changes.

h. (U) Initial sea trials occurred aboard USS AMERICA from 30 October to 3 November and exceeded the expectations of all participants. All test objectives were met on the third of the four operating days. The F/A-18 was deployed for sea trials

earlier in development than any other modern airplane, and it exhibited the potential to be one of the best airplanes ever built for carrier operations. During the sea trials, the F/A-18 made 32 arrested landings, 17 touch and go landings, and 32 catapults. All catapults were made "hands off the control stick". The handling qualities during approach and landing were superb, and no unintentional bolters were experienced. The F/A-18 demonstrated 75% availability for the 30 day buildup period prior to sea trials and demonstrated 100% availability during the four day at sea period; no maintenance was performed except for normal servicing. The only areas of concern were the failure of the retaining nut on the catapult holdback mechanism and failure of the mounting lug for the planing link of the left main landing gear. The components which caused these problems have been redesigned, and corrections have been verified.

i. (U) The contractor and Navy development separation tests and tactical firings of AIM-9 and AIM-7 missiles, and the M61A1 gun have been completed. The tactical firing of missiles was a total success, and the accuracy of the gun director system has been verified. Weapons system development is on schedule and all air-to-ground radar modes are operational. Development will be complete prior to start of BIS and OPEVAL.

j. (U) The status of some other developmental problems surfaced during flight test are discussed below:

(1) Forces required to move leading edge flaps greater than capacity of actuating system - flap loads reduced by decreasing the leading edge flap radius and minimizing the flap freeplay. The reduced area leading edge flaps have been flight-tested and system capability now exceeds the worst-case flap actuation forces by a 25% margin.

(2) Roll rate deficient at low altitude above 500 knots - the aileron was extended to the wingtip, wing stiffened with graphite fibers, and trailing edge flaps modified to serve as a limited throw aileron. The fix has proven satisfactory and has been verified by the Navy. Fallout benefits include improvement in flutter margin and approach speed.

(3) Initial mission range estimates below thresold - a number of drag reduction fixes have been incorporated and range is within a few percent of the fighter range threshold and exceeds the attack threshold.

(4) Acceleration time from .8-1.6M above threshold - drag reduction fixes reduced acceleration time but did not meet threshold. Rather than reduce engine life to meet the threshold, the threshold has been reduced to the more significant transonic regime 0.8 - 1.2M.

(5) Number 4 fuel cell leakage - the cause of fuel cell leaks in the #4 fuel cell has been identified as improper production techniques and inadequate acceptance test procedures. These corrections have been made and no leaks have been encountered in the #4 fuel cell on any production airplanes (F-10 and sub).

(6) There have been some incidents of gun gas discharge flowing back against the windscreen. This is most severe at very high angles of attack at very high altitude. Under normal operating conditions, the degradation is not sufficient to justify modifying the gun installation.

k. (U) Single site testing at Naval Air Test Center is providing numerous benefits during Full Scale Development and has given the Navy the opportunity to obtain a greater depth of knowledge of the airplane at an earlier stage of development than previous full scale development programs. During the entire development of the F/A-18, accurate subsystem data are being collected to validate reliability and maintainability predictions. The Mean Flight Hours Between Failure required by the specification to be confirmed by OPTEVFOR with Navy maintenance personnel during IOT&E.

2. (U) Operational Test and Evaluation (OT&E).

a. OT&E is being conducted by COMOPTEVFOR, the Navy's independent operational test agency. Navy and Marine Corps fighter and attack pilots from OPTEVFOR Detachment, Patuxent River, Maryland, and Air Test and Evaluation Squadrons FOUR (VX-4) and FIVE (VX-5) are participating. OT&E is providing the basis for assessing the operational effectiveness (including survivability and vulnerability) and operational suitability of the F/A-18, developing tactics, estimating the need for airplane and weapons system modifications and verifying fixes already made, and assessing planned fleet training and maintenance support.

b. To date, COMOPTEVFOR has monitored the contractor F/A-18 development program, participated in the radar/avionics NPA's (Navy Preliminary Assessments), participated in two NPE's (Navy Preliminary Evaluations), and provided an LSO (Landing Signal Officer) and maintenance observer for initial sea trials. Additionally, COMOPTEVFOR completed a two-week independent evaluation of the F/A-18 in March 1980 to support DSARC IIIA, and a four-month independent evaluation completed in February 1981 to support DSARC III (fighter). Since February 1981, COMOPTEVFOR has continued to monitor contractor DT&E at NAVAIRTESTCEN, and has been conducting AIM-7 and AIM-9 DT&E and OT&E missile firings at the Pacific Missile Test Center.

c. Significant OT&E results have been as follows:

(1) Lack of test airplanes in the production peformance configuration and inconsistent weapons system performance precluded a meaningful assessment of F/A-18 potential during the March 1980 OT&E period. Operational deficiencies noted during these tests were provided to NAVAIRSYSCOM for correction.

(2) Airplane and weapons system performance during the four-month OT&E period completed in February 1981 resulted in a COMOPTEVFOR recommendation for PASU (provision approval for service use) for the F/A-18 for the fighter mission. Operational readiness, mission reliability, and performance in ACM (air combat maneuvering) against simulated threat aircraft were judged good. One pilot production airplane was lost during ACM build-ups following an inadvertent spin from which recovery was not made.

OT&E was suspended while McDonnell Douglas and Navy test pilots conducted F/A-18 spin testing and evaluated fixes to the airplane which would assure spin recovery. Areas of concern in F/A-18 attack system were also identified which will require further evaluation as F/A-18 sensors, attack radar modes and airplane performance are further developed.

d. Future OT&E will consist primarily of fighter and attack OPEVAL's (Operational Evaluations) to be conducted concurrently in fourth quarter, FY 82, at NAS, Pt Mugu and NWC, China Lake. OPEVAL scope may be affected by limited opportunity to evaluate airplanes in the Roll Rate II/6.0 PROM configuration which will impact ground attack, ACM, and shipboard compatibility testing. Addiditionally, concurrent development of EW (electronic warfare) hardware and advanced technology weapons such as HARM will necessitate deferral of OT&E on these systems until after DSARC III (Attack) production decision.

All IOT&E and FOT&E will provide the basis for:

(1) An evaluation of operational effectiveness (including survivability/vulnerability) and operational suitability (including availability, compatibility, transportability, interoperability, reliability, maintainability, safety, human factors, logistic supportability and training requirements) of the F/A-18 aircraft.

(2) Tactics development.

(3) Estimating the need for any modifications and verifying fixes already made.

(4) Evaluating the suitability of training and maintenance planning to support F/A-18 fleet introduction.

	1 Dev. Est.	2 App. Prog.	3 Demo. Perf.	4 Curr. Est.
3. (U) Systems Characteristics/ References	a/	b/		c/
1. (U) Operational				
a. (U) Speed (VF) (MACH)				
(1) At Sea Level, Combat Weight	[1.7#/1/]	1.7#/	1.7#/	[1.7#/]
(2) (U) At Altitude, Combat Weight				

Program Element: 64263N
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Title: F/A-18 Naval Strike Fighter
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	(3) (U) Velocity Powered Approach, Minimum (VPA MIN), 6,000 lbs of fuel and/or droppable stores (Kt)	132	132	132	132
b.	Radius, Nautical Miles				
	(1) (U) Fighter Escort, Internal Fuel (VF)	400	400	394	404
	(2) (U) Strike Mission Navy Attack (VA)	550	550		570
c.	(U) Combat Ceiling (Ft) (VF)				
	(1) (U) Minimum Thrust	[ ]1/	[ ]		[ ]
	(2) (U) Military Thrust	48,100	45,000	48,000	48,000
d.	(U) Minimum Wind Over Deck Requirements (Kt) (VF)				
	(1) Catapult, VF take-off gross weight	0#/	0#/		0#/
	(2) Landing, 6,000 lbs of Fuel and droppable stores	0#/	0#/	5	5
e.	(U) Mission Reliability (%) VF @ 2,500 Hr	0.7	0.7	.82 3/	0.8
f.	Acceleration Max Power (sec) M=0.8 to 1.2 @ 35,000 feet	48	56	[ ]	[ ]
g.	(U) Rate of Climb, at Sea Level, Single Engine, Powered Approach (PA) Configuration (VF)	[ ]	[ ]	[ ]	[ ]
h.	(U) System Maintenance (VF)				
	(1) Mean Flight Hours Between Failure, Fighter Configuration (@2,500 Hours)	1.4	1.4	2.37 3/	3.7
	(2) Organization Level Unscheduled Direct Maintenance Manhours per Flight Hour (VF @2,500 Hours)	8	8	6.1 3/	6
	(3) Maintenance Operating Factor (MOF) (Maintenance Men per aircraft)	12 2/	12 2/		12 2/
i.	(U) Standard Depot Level Maintenance (SDLM), (Mos)	48#/	48#/		48#/
j.	(U) Pratfall Weapons Delivery System Accuracy-Mils	[ ]	[ ]		[ ]

Program Element: 64263M
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: F/A-18 Naval Strike Fighter
Budget Activity: 4 - Tactical Programs

k. (U) Air-to-Air Radar Detection Range				
(1) (U) Lookdown, R90, RWS, 5M2 target (NM)	[ ]	[ ]	[ ]	[ ]
(2) (U) Lookdown, R90, VS, 5M2 Target (NM)				
2. (U) Technical				
a. (U) Weight (lb)				
(1) Empty (VF)	21,649#/1/	21,649#/	22,37?#/	22,234#/
(2) Empty (VA)	21,720#/1/	21,720#/	22,373#/	22,234#/
(3) Maximum take-off gross, escort mission (VF)	35,500	36,000	[ ]	[ ]
(4) (U) Maximum take-off gross, interdiction mission (VA)	47,144#/1/	47,144#/		48,077#/
b. (U) Dimensions (Ft)				
(1) Length	56#/	56#/	5o	56#/
(2) Height	15.3#/	15.3#/	15.3	15.3#/
(3) Wing Span	37.5#/	37.5#/	37.5	37.5#/
c. (U) Spotting Factor, A-7 Equivalent	1.2	1.2	1.2	1.2
d. (U) Usable Load Factor, Subsonic Fighter Configuration at Combat Weight (VF) (g)	+7.0	+7.0	[ ]	[ ]
e. (U) F404-Engine, sea level static uninstalled thrust and specific fuel consumption				
(1) (U) Maximum Threat (lbs)	[ ]	[ ]	[ ]	[ ]
Specific Fuel Consuaption (Lbs fuel/hr/lb thrust)	[ ]	[ ]	[ ]	[ ]
(2) (U) Military Thrust (lbs)				
(3) (U) Specific Fuel Consumption (lbs fuel/hr/lb thrust)				

Program Element: 64263N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: F/A-18 Naval Strike Fighter
Budget Activity: 4 - Tactical Programs

NOTES:

1/ For these data elements, initial Milestone II values were established as the Planning Estimate (PE) with the Development Estimate (DE) to be based on the design resulting from the Detail Design Review. This Review was held on 26 and 27 October 1977 and the changes were incorporated in the subsequent Selected Acquisition Report (December 1977). There have been no other changes in these DE values.

2/ This reporting factor is no longer being used and was mistakenly deleted from the March 1980 SAR.

3/ R&M data from IOT&E, not 2500 flight hour data.

#/ Items not required by Decision Coordinating Paper 141.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64264N
DoD Mission Area: 235 - Naval Warfare Support

Title: Life 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	11,815	10,674	6,902	7,284	Continuing	Continuing
W0606	Aviation Personnel Life Support Systems	2,234	2,061	6,902	7,284	Continuing	Continuing
W1100	A-7 Escape System	9,581	8,613	0	0	0	27,136

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides for the engineering development, technical evaluation, and initial operational test and evaluation of a family of Aircrew Life Support Equipment for Naval aircraft weapons systems. This includes the integrated assemblages of components and techniques required to assure aircrews and passengers the most effective inflight environment, inflight escape capability, and emergency protection and survival provisions. This program element accomplishes the transition of Life Support Equipment from advanced development to engineering development followed by release for production and service use and the development of a replacement ejection seat for the A-7 aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST:

W0606-SL - Aviation Personnel Life Support Systems: Conduct Technical Evaluation on the Ejection Seat Restraint System. Obtain Approval for Service Use on the Anti-Exposure Garment. Complete Technical Evaluation on the Aircrew Flotation System. Complete Operational Evaluation on the Emergency Oxygen System. Complete Technical Evaluation on the Chemical/Biological/Radiological Flight Crew Protective System. Obtain Approval for Service Use on the HGU-35/P Helmet. 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: Project W0606: FY 1981 increase of 84 is for escalation; FY 1982 decrease of 28 results from program cost refinement; FY 1983 decrease of 173 is for program cost refinment. Project W1100: Scope of program has been reduced from A-4, A-7 and S-3 aircraft to A-7 aircraft only. FY 1981 increase of 463 is for escalation; FY 1982 decrease results from program cost refinement; elimination of funding in "Additional to Completion" and reduction of funding in "Total Estimated Cost" results from cancellation of A4 and S3 portions.

Program Element: 64264N
DoD Mission Area: 235 - Naval Warfare Support

Title: Life 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	5,267	1.,268	10,829	7,075	Continuing	Continuing
W0606	Aviation Personnel Life Support Systems	977	2,150	2,089	7,075	Continuing	Continuing
W0994	MANSAFE (Sea Water Activated Release System - SEAWARS)	453	-	-	0	0	1,687
W1100	A-4/A-7/S-3 Escape System	3,837	9,118	8,740	0	14,800	41,600

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN-5 (A-7/A-4 Escape Equipment)	6,119	6,764	-	-	-	12,883
APN-5 (SEAWARS)	-	-	7,615	5,651	4,649	17,915
APN-6 (A-7/A-4 Escape Equipment)	667	-	-	-	-	779
APN-6 (SEAWARS)	-	-	842	645	510	1,997

Note: Quantities for above consist of various components and equipment.

Program Element: 64264N
DoD Mission Area: 235 - Naval Warfare Support

Title: Life Support Equipment
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: W0606 - Aviation Personnel Life Support Systems: This project provides maximum functional capability of aircrews during normal missions and also provides a means to enhance safe and reliable escape, descent, survival, and recovery in combat and peacetime emergency situations. This continuing project provides for the conduct of necessary engineering development, test and evaluation, and initial operational test and evaluation of Aviation Personnel Life Support Systems. This project accomplishes the transition of life support systems from advanced development to completion of full scale development to demonstrate that the design meets performance, reliability, maintainability, supportability, survivability and system safety specifications prior to the first major production decision. W1100 - A-7 Escape System: The A-7 Ejection Seat Replacement Program will replace the current ejection seats in these aircraft with a state-of-the-art escape system. The principle features of the new seats will be improved reliability, increased maintainability, and improved operation to reduce the fatality and injury rate. The first seats delivered will be incorporated into A-7 aircraft beginning in June 1982.

(U) RELATED ACTIVITIES: Program Element 62241N, Aircraft Technology; Program Element 62758N, Biomedical Technology; Program Element 63216N, Airborne Life Support Systems; and Program Element 63203N, Advanced Helicopter Developments. Related Air Force efforts, supported by Program Element 64706F, Life Support Equipment, are coordinated through the tri-service Life Support Equipment Steering Group.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Ordnance Station, Indian Head, MD; Naval Air Test Center, Patuxent River, MD; Naval Weapons Center, China Lake, CA. Contractors: Stencel Aero Engineering, Asheville, NC; Vought Aeronautics, Dallas, TX; and others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0606: Aviation Personnel Life Support Systems: Completed Operational Test and Evaluation on the Automatic Inflator and obtained Approval for Service Use. Conducted Technical Evaluation on the CWU-46/P Knit Flight Suit. Initiated Technical Test and completed reliability and maintainability testing of the EGU-35/P Aviator's Lightweight Helmet. Procured Technical Evaluation quantities of the Anti-Exposure Protective System and Helicopter Emergency Lighting portion of Helicopter Survivability Enhancement program subsystem. Prepared preliminary documentation on the Emergency Oxygen System and commenced Technical Evaluation. W1100 - A-7 Escape System: Conducted first phase of System Testing. Component Design Verification Testing is complete. Issued production contract to Vought for Interface Hardware and procured Initial Production Run of 240 seats. A competitive contract for research and development with fixed price options for production was issued to Stencel Aero Engineering Corporation. Engineering has begun and mock-ups have been installed in all models of A-7 and TA-7 aircraft. Sled testing has been completed for single place A-7.

Program Element: 64264N
Title: Life Support Equipment
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: W0606 - Aviation Personnel Life Support Systems: Complete Technical Evaluation/Operational Evaluation on the Anti-Exposure Garment. Complete Operational Evaluation on the HGU-35/P Helmet and obtain approval for service use. Begin Technical Evaluation on the Chemical/Biological/Radiological Flight Crew Protection System. Complete evaluation and testing of several available designs for the Ejection Seat Restraint System. W1100-SL - A-7 Escape System: Conduct TA-7 engineering. Conduct TA- sled tests.

3. (U) FY 1983 Planned Program: W0606 - Aviation Personnel Life Support Systems: Conduct Technical Evaluation on the selected design of the Ejection Seat Restraint System. Obtain Approval for Service Use on the Anti-Exposure Garment. Complete Technical Evaluation on the Chemical/Biological/Radiological Flight Crew Protective System. Obtain Approval for Service Use on the HGU-35/P Helmet. Complete Technical Evaluation on the Aircrew Flotation System (Multi-Man Raft). Conduct and complete Operational Evaluation on the Emergency Oxygen System. Procure hardware for Technical Evaluation of the Laser Protective Device.

4. (U) FY 1984 Planned Program: W0606 - Aviation Personnel Life Support Systems: Conduct Operational Evaluation on the Ejection Seat Restraint System. Complete Operational Evaluation on the Chemical/Biological/Radiological Flight Crew Protective System. Complete Operational Evaluation on the Aircrew Flotation System. Obtain Approval for Service Use on the Emergency Oxygen System. Conduct Technical Evaluation on the Laser Protective Device. Conduct Technical Evaluation on sub-systems of the Parachute System, Ejection Seat Propellant, and the Passive Flotation System.

5. (U) Program to Completion: W0606 - Aviation Personnel Life Support Systems: Continuing project which accomplishes the transition of Aviation Personnel Life Support System subprojects from advanced development through engineering development and Approval for Service Use. W1100 - A-7 Escape System: Initiate design engineering for the TA-7 aircraft. Perform engineering development, test and evaluation phase for TA-7 aircraft. Approval for Service Use to be obtained by May 1983.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64266N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Signal Processor
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	7,199	3,292	3,525	TBD	TBD	TBD
W0491	Advanced Signal Processor	3,150	3,292	3,525	TBD	TBD	TBD
W0476	Digital Acoustic Sensor Simulator	1,049	0	0	0	0	8,477
	Quantity (Prototype)						(3)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Advanced Signal Processor provides for engineering development of a standard Navy acoustic processor which will be used to meet the acoustic signal processing requirements of the active and passive sensors designed for the 1980's and 1990's submarine threat. The Digital Acoustic Sensor Simulator provides for engineering development of a device used for proficiency training of ASW acoustic operators of squadrons deployed at remote sites.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Advanced Signal Processor project will continue to support user testing and correction of design deficiencies, as well as, the development of a 64 thousand density Random Access Memory for reliability enhancement and the development of follow-on support and operational software. The above outyear funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1983.

(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 total reduction of 8,134 (455 in FY 1981, 3,795 in FY 1982, 1,390 in FY 1983 and 2,494 in the outyears) to fund higher priority programs resulting in a cancellation of the Digital Acoustic Sensor Simulator project. Additional decreases occurred of 68 in FY 1981 for general de-escalation, 161 in FY 1982 and 236 in FY 1983 resulting from de-escalation (164), Navy budget adjustment (113), and Navy distribution of DoD reduction for consultant support (120).

(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	6,830	7,722	7,248	5,151	2,494	122,314
W0491	Advanced Signal Processor	6,330	6,665	3,453	3,761	0	106,150

Program Element: 64266N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Signal Processor
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
W0476	Digital Acoustic Sensor Simulator Quantity	500*	1,057 (T&E)	3,795 (T&E)	1,390	2,494	16,164 (3)

* Also funded in PE 63254N in FY 1980.

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 64266N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Signal Processor
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Advanced Signal Processor program provides for the development of a fully programmable acoustic processing system designed to analyze, process, and display signals received by underwater acoustic sensors. The Advanced Signal Processor system consists of two functional units, an analyzer unit and a display and control unit. The system is modular in design to meet the future needs of anti-submarine warfare platforms and the analyzer unit can be used with current and planned acoustic sensors. The Advanced Signal Processor offers significant life cycle cost savings over multiple signal processors through a single, common logistics support base. Common operational software for the Advanced Signal Processor to be used in the P-3C, S-3B, and SH-60B known as Major System Mode-11 will provide to these platforms the capabilities now provided for the P-3C and SH-60B by the predecessor software Major System Mode-10 as well as significant new capabilities, to include a doubling of processor channels, automatic passive acoustic tracking algorithm and advanced sonobuoys. Additionally, Major System Mode-11 will utilize modular processing functions and will use a high order language, SPL-1, to lower life cycle costs. The Digital Acoustic Sensor Simulator project provides an interactive training device designed to improve P-3, S-3 and SH-60B acoustic operator proficiency. The device is intended to provide hitherto unavailable realistic acoustic simulation at remote aviation anti-submarine warfare sites. In addition, the device may be integrated into future weapon systems trainers. Significant improvements in training and large savings in aircraft operating costs and sonobuoy expenditures are achievable.

(U) RELATED ACTIVITIES: The following projects are utilizing or planning to utilize the Advanced Signal Processor for signal processing, (the Advanced Signal Processor is mission critical for each): Program Element 63504N, Submarine Sonar Development (Advanced); Program Element 25623N, S0217, AN/SQS-53 Sonar Improvement; Program Element 64789N, Surveillance Towed Array Sensor; Program Element 64503N, Submarine Sonar Development; Program Element 64713N, project S0234, Tactical Towed Array Sonar; Program Element 64219N, project W0484, Anti-Submarine Warfare Avionics Improvements; Program Element 64261N, project W0478, Expendable, Reliable Acoustic Path Sonobuoy, project W0479, Advanced Sonobuoy Communications Link, and project W0480, Passive Advanced Sonobuoy; Program Element 64212N, project W0474, Light Airborne Multi-Purpose System MK III. The Advanced Signal Processor is being considered for application in: Program Element 64219N, project S0486, Anti-Submarine Warfare Operations Center; Program Element 63228N, project S0517, Aircraft Carrier, Anti-Submarine Warfare Module; and Electronic Support Measures/Electronic Countermeasures programs in general.

(U) WORK PERFORMED BY: In House: Naval Surface Weapons Center, Silver Spring, MD; Naval Air Development Center, Warminster, PA; Naval Research Laboratory, Washington, DC; and Naval Personnel Research and Development Center, San Diego, CA. Contractors: International Business Machines, Manassas, VA; General Physics Corp., Columbia, MD; General Electric, Syracuse, NY; Intermetrics, Cambridge, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Advanced Signal Processor transitioned into engineering development in FY 1976. The feasibility of an optical signal processor and a programmable digital signal processor (Advanced Signal Processor) was

evaluated. A channel requirement study was completed. Twenty-two (22) Advanced Signal Processor service test models were procured with four utilized for design validation testing. Seven preproduction units were delivered in FY 1979 and the Advanced Signal Processor program supported the Surveillance Towed Array Sensor technical evaluation. A controlled software development facility was established at the Naval Air Development Center for all Advanced Signal Processor users. In 1979, environmental and reliability testing of service test models and development of initial operational signal processing software for P-3C Update III and Light Airborne Multi-Purpose System MK III were completed. In FY 1980, a tactical towed array system Advanced Signal Processor containing two analyzer units and a bulk storage unit was developed and delivered. A P-3 Single Advanced Signal Processor configured analyzer and display was developed. Development of a water cooled Triple Advanced Signal Processor for submarine application and development of a 64 thousand density Random Access Memory was begun. In FY 1981, the Advanced Signal Processor service test model and pre-production contracts were initiated. P-3C Update III and Light Airborne Multi-Purpose System technical and operational test and evaluation support was initiated. The development of follow-on signal processing and support software for air anti-submarine warfare platforms commenced. The Triple Advanced Signal Processor, and the 64 thousand Random Access Memory development continued. The Digital Acoustic Sensor Simulator transferred from Program Element 63254N in FY 1980. The first advanced development acoustic simulation module was produced in FY 1979 and utilized to support test and evaluation of the Light Airborne Multi-Purpose System. In FY 1981, a program restructure emphasized the development of a tape-based deployable system capable of stimulating aircraft acoustic stations with realistic target data. Two prototype engineering model acoustic simulator modules were procured to support tape development.

2. (U) FY 1982 Planned Program: The Advanced Signal Processor service test model and preproduction contracts will be completed. Full scale production to meet user requirements initiated. P-3C Update III and Light Airborne Multi-Purpose System technical and operational test and evaluation support will continue. The development of Major System Mode-11 operational software for P-3C, S-3B, and SH-60B will commence. The development of the Triple Advanced Signal Processor for the BQQ-5 will continue. 64 thousand Random Access Memory development will be completed. S-3B Advanced Signal Processor development will continue.

3. (U) FY 1983 Planned Program: S-3B Advanced Signal Processor development and follow-on Major System Mode-11 software development will continue. Support Tactical Towed Array System technical and operational evaluations.

4. (U) FY 1984 Planned Program: Full scale production and in-line acceptance of the Advanced Signal Processor will continue. Major System Mode-11 software development will continue.

5. (U) Program to Completion: The Advanced Signal Processor will complete Major System Mode-11 software development and initiate very high speed integrated circuit technology pre-planned improvement program.

6. (U) Milestones: Not Applicable

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64267N
Title: AWG-9 Update
DoD Mission Area: 231 - Anti-Air 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	24,218	4,206	6,978	3,079	23,350	88,342
W1254	F-14 Programmable Signal Processor	20,693	1,712	4,157	0	0	51,872
	(Quantity)	(T&E)	(T&E)	(T&E)	Production		(8)
W0467	F-14 Target Identification Software	3,525	2,494	2,821	3,079	23,350	36,470

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This operational system improvement will integrate the Programmable Signal Processor into the F-14 AWG-9 weapon control system converting the system from analog to high speed programmable digital signal processing technology. This digital upgrade will provide improved Electronic Counter Countermeasures performance and increased Reliability and Maintainability. Additionally, the digital processing will allow incorporation of the Target Identification Software being developed under W0467. When incorporated, the Target Identification Software will provide long range positive target identification which will permit more effective employment of beyond visual range missiles. Target Identification Software development efforts include integration of various identification techniques into an optimum Non-cooperative Target Recognition scheme. Work done under Program Element 63515N, Advanced Identification Techniques project provides the identification techniques used in the Target Identification Software project.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Full Scale Engineering Development contract was signed in FY 1980. In FY 1981 and 1982 flight and laboratory testing of the four Programmable Signal Processor Engineering Development Models and the four pre-production systems will continue for purposes of verifying radar performance in the areas of Electronic Counter Countermeasures, high clutter detection/track and reliability/maintainability. Approval for Service Use of the Programmable Signal Processor will be granted after successful Operational Evaluation testing in FY 1983. Development of the target identification software, which will incorporate non-cooperative target recognition capability in the AWG-9 tactical tape will continue. 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: W1254 Programmable Signal Processor: The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary results from Navy reprogramming (+1,956 in FY 1981) and Navy budget adjustments and general reductions for inflation (+176 in FY 1981 and -23 in FY 1982). A delay in the

Program Element: 64267N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AWG-9 Update
Budget Activity: 4 - Tactical Programs

program sipped the Technical Evaluation and the Operational Evaluation requiring FY 1983 funds not originally programmed. W0467 Target Identification Software: Navy reprogramming (-199 in FY 1981) and the reduction for inflation and budget adjustments (-397 in FY 1981, -34 in FY 1982, and -416 in FY 1983) accounted for the differences in this 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	26,510	22,682	4,623	3,237	10,077	65,769
W1254	F-14 Programmable Signal Processor	25,310	18,561	1,735	0	0	45,606
	(Quantity)	(T&E)	(T&E)				(26)
W0467	F-14 Target Identification Software	1,200	4,121	2,528	3,237	10,077	21,163

(U) OTHER APPROPRIATIONS FUNDS:

		FY 1981 Actual	FY [illegible] Estima.	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL Aircraft Procurement Navy (APN)	0	0	0	86,301	215,587	304,888
W0467	F-14 Target Identification Software	0	0	0	0	0	*
W1254	F-14 Programmable Signal Processor	0	0	0	86,301	218,587	304,886
	(Quantity)						(450)

* RDT&E funding only required for development and integration into tactical software.

Program Element: 64267N
Title: AWG-9 Update
DoD Mission Area: 231 - Anti-Air Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The FY 1980 budget split the Programmable Signal Processor and Target Identification Software developments into two separate projects. The Programmable Signal Processor is an AWG-9 operational system improvement which converts the system from analog to programmable digital signal processing technology. Near term benefits derived from Programmable Signal Processor incorporation are increased reliability and maintainability, improved digital Electronic Counter Countermeasures processing techniques, and expanded missile launch zones. The growth/flexibility of the Programmable Signal Processor also supports major improvements such as [redacted] incorporation of advanced identification techniques, and allows further system evolution through software modification. The Programmable Signal Processor processing capability is required to support the Non-Cooperative Target Recognition functions being developed under the Target Identification Software project. The Target Identification Software project will continue on the current schedule and be incorporated into the F-14 after completion of all appropriate testing and management reviews. Engineering development model hardware is required for Development Test and Evaluation and Initial Operational Test and Evaluation.

(U) RELATED ACTIVITIES: The F-15 and F-18 are incorporating a Programmable Signal Processor into their weapons control systems. These Programmable Signal Processors have commonality with the F-14 Programmable Signal Processor. Program Element 63515N Advanced Identification Techniques is developing the various identification techniques to be incorporated through software in the Target Identification Software project.

(U) WORK PERFORMED BY: W1254 - Programmable Signal Processor: The Programmable Signal Processor will be developed by Hughes Aircraft Company, El Segundo, CA. Technical coordination will be performed by the Naval Air Development Center, Warminster, PA. Navy test and evaluation will be performed by the Pacific Missile Test Center, Pt. Mugu, CA. W0467 - Target Identification Software: The Target Identification Software will be developed by Hughes Aircraft Company, El Segundo, CA. Technical coordination will be performed by the Naval Air Development Center, Warminster, PA. Navy test and evaluation will be performed by the Pacific Missile Test Center, Pt. Mugu, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W1254 - Programmable Signal Processor: Project go-ahead occurred during May 1976. Development models were fabricated and delivered. Laboratory tests were conducted and a roofhouse demonstration of a Programmable Signal Processor configured AWG-9 weapon system was conducted against multiple targets in July 1978. A Navy Technical Assessment of Programmable Signal Processor configured AWG-9 in a TA-3B aircraft against multiple targets was successfully accomplished in July 1979. The Full Scale Development contract for the Programmable Signal Processor was executed in December 1979. The Navy Preliminary Evaluation was completed in April 1981 as a program check of contractor's development effort. Reliability and environmental qualification testing commenced. W0467 - Target Identification Software: The Non-Cooperative Target Recognition

technique was successfully demonstrated in the F-14/AWG-9 Weapons Control System Roofhouse Laboratory in February 1977. Further refinements to the Non-Cooperative Target Recognition technique were made and demonstrated during FY 1978 in the AWG-9 Multi-Target Track-While-Scan operating mode. The Non-Cooperative Target Recognition technique was demonstrated in flight during the Navy Technical Assessment. The Full Scale Development contract for the Target Identification Software was executed in June 1979. Laboratory and very limited flight testing was performed in FY 1981.

2. (U) FY 1982 Program: W1254 - Programmable Signal Processor: Flight and laboratory testing of the four Programmable Signal Processor engineering development models and the four pre-production models will continue. The full Programmable Signal Processor reliability and qualification test program will complete. The final Navy Preliminary Evaluation of the Programmable Signal Processor software development tape, designated DY-2, which will replicate current AWG-9 functions, in an Electronic Counter Measure environment will be completed. Final integration of the development software into the tactical tape will continue. W0467 - Target Identification Software - Laboratory software development will continue.

3. (U) FY 1983 Planned Program: W1254 - Programmable Signal Processor: Initial Operational Test and Evaluation of the Programmable Signal Processor (hardware and software) will be completed. Approval for Service Use for the Programmable Signal Processor will be granted and the in-line installation of the Programmable Signal Processor configured in the F-14 will commence with delivery in FY 1985 and the retrofit kits will commence delivery in FY 1986. W0467 - Target Identification Software: Development and in-house laboratory testing of a tactical software tape, which incorporates a non-cooperative target recognition capability, will continue and flight testing will commence.

4. (U) FY 1984 Planned Program: W1254 - Programmable Signal Processor: Development completed in FY 1983. In-line production of Programmable Signal Processor configured AWG-9 Weapons Control Systems will commence in FY 1984. W0467 - Target Identification Software: Navy Technical Evaluation of tactical tape will be conducted and Operational Evaluation will commence.

5. (U) Program to Completion: W1254 - Programmable Signal Processor - Development completed in FY 1983. In-line installation of Programmable Signal Processor configured AWG-9 Weapons Control Systems commenced in mid FY 1985. Delivery of Programmable Signal Processor retrofit kits will commence in FY 1986. W0467 - Target Identification Software: Operational Evaluation of tactical tape will be completed in early FY 1985.

Program Element: 64267N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AWG-9 Update
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

	Milestone		Date
a.	Roofhouse Demonstration		July 1978
b.	Flight Test Demonstration		July 1979
c.	Programmable Signal Processor Release Decision	*(Feb 81)	August 1982
d.	Programmable Signal Processor Operational Evaluation	*(Mar 82)	April 1983
e.	Target Identification Software Technical Evaluation	*(Nov 82)	January 1984
f.	Target Identification Software Operational Evaluation	*(Aug 83)	July 1984
g.	Programmable Signal Processor Full Production Decision	*(Mar 82)	October 1984

* Date shown in FY 1982 Descriptive Summary. The changes in milestones c through g reflects further refinements to the Test and Evaluation Plan, a four month delay in the completion of contractor development of the Programmable Signal Processor and a restructure of the Target Identification Software development program.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64268N
Title: Aircraft Engine Component Improvement Program
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	71,202	82,338	89,486	96,620	Continuing	Continuing
W1355	Aircraft Engine Component Improvement Program	71,202	82,338	89,486	96,620	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Successful completion of an aircraft engine development is followed by a component improvement program designed to identify and correct engine problems (and potential problems) revealed during service use and upgrade durability, maintainability, reliability and suitability during the service life of the engine. Significant life cycle cost savings may result from reduced maintenance man hours, spare parts and engine requirements and overall level of support logistics. The program effort does not increase or expand the basic performance characteristics beyond those defined in the engine model specification. This is a continuous program representing the minimum level of engineering support required for improvements essential to safe satisfactory performance of aircraft engines in the fleet. Where applicable, funds include the Navy share of joint programs mutually supported with Air Force, Army and foreign users of like engines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: A Component Improvement Program is required for each operational engine and related hardware in order to be able to identify and resolve problems that occur during service use. Engineering support is required for the following types of effort: (1) rapid analysis and solution of service problems, (2) aggressive mission testing of engines and components for early detection of deficiencies to minimize service problems and to extend initial parts lives, and (3) design and test verification of required improvements. The following engines, in order of funding, will be supported during FY 1983:

Engine Model	Aircraft Application
F-404	F-18
F-402	AV-8
TF-30	F-14, A-7
TF-41	A-7
TF-34	S-3
T700	SH-60B
J-52	A-4, A-6
J-58	H-2, H-3, H-46

Program Element: 64268N
DoD Mission Area: 235 - Naval Warfare Support

Title: Aircraft Engine Component Improvement Program
Budget Activity: 4 - Tactical Programs

Engine Model	Aircraft Application
T-56	P-3, C-130, E-2, C-2
T-64	H-53
J-79	F-4
T-400	H-1
T-76	OV-10
J-85	F-5, T-38, T-2
R1820	C-1, S-2, T-58

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 decreases of -1,681 in FY 1981, -8,277 in FY 1982 (including -5,000 Congressional reduction) and -12,273 in FY 1983. FY 1981 decrease is due to refined estimates of costs including escalation. FY 1982 and FY 1983 decreases are a result of Navy budget reduction.

(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	59,570	72,883	90,615	101,759	Continuing	Continuing
W1355	Engine Component Improvement Program	59,570	72,883	90,615	101,759	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 64268N
Title: Aircraft Engine Component Improvement Program
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: It is necessary to maintain an engineering test and analysis capability for aircraft engines following the engine development period, to address problems that occur over the operational lifetime of that engine. The Navy Component Improvement Program was funded in Navy Aircraft Procurement Appropriation, Budget Activity 7, Aircraft Support Equipment and Facilities, prior to 1980. During an engine development program, specified engine requirements for performance, weight, durability, maintainability, reliability, etc., are met. Normally, in the time available for engine development, many problems will be identified and solved. However, the limitations of ground testing and a comparatively short flight testing period will not uncover all operational difficulties. Experience has confirmed that the engine will not achieve its final maturity level until after it has been in operational use for many years. It is during these subsequent years when many of the engine's problems are identified and solved via the Component Improvement Program. As the engine progresses through its life cycle, increased component failure or malfunctions, operational problems, and hardware condemnation will occur with increasing age. These problems must have timely corrective action through modification with redesigned components. Also, there are instances where suppliers of components or spare parts go out of business, discontinue manufacturing items for lack of production volume, increase prices for low quantity orders, or consolidate divisions within a parent company which entails relocation of tooling and training new people. Engineering surveillance and/or qualification testing of alternate or second sources of critical engine parts are required to maintain a supply of needed components with acceptable reliability. The Component Improvement Program is the vehicle by which engine problems are identified, investigated and resolved. It is essential that this program exist and operate in order for an engine to reach maturity and remain a useful power plant throughout its life cycle. Without timely engineering solutions of the service revealed problems and accelerated mission testing revealed problems, reduced operational readiness and increased maintenance and overhaul costs will jeopardize the capability of the fleet to achieve its mission requirements. Component Improvement Program is an engineering effort obtained from the original engine manufacturer and procured and managed by either the Air Force or Navy, or both. The specific efforts undertaken are determined by the contracting agency (Air Force or Navy) after consideration of the development and operational experience, and the recommendation of all the engine users. In addition, the maturity and logistics goals established for the particular engine are used as program guidelines. Historically, during the early production periods, the Component Improvement Program effort concentrates on resolving early operational problems found with the engine, and ensure the redesign of engine parts to reduce the production cost. As the engine matures, greater emphasis is placed on engine component durability, maintainability, and reliability through redesign of low reliability parts and the development of repair procedures to return used parts to a serviceable condition. The end result of the Component Improvement Program is improved engine readiness, longer engine useful life, lower follow-on engine parts costs, and reduced logistic support costs.

(U) RELATED ACTIVITIES: None

(U) WORK PERFORMED BY: In-House: Naval Air Propulsion Center, Trenton, NJ; Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Weapon Support Center, Crane, IN. Contractors: Detroit Diesel - Allison, Indianapolis, IN; General Electric Company, Lynn, MA; Evendale, OH; Air Research Division, Phoenix, AZ; Pratt and Whitney of

Canada, Limited, Montreal, Canada; Pratt and Whitney Aircraft Group, West Palm Beach, FL; Rolls Royce, London, England; Solar Division, IHC, San Diego, CA; Bendix Corporation, Utica, NY; Hamilton Standard Division, Windsor Locks, CT; Lucas, Englewood, NJ; Williams Research, Walled Lake, MI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: There are at least 17 different engines included in this effort. Significant accomplishments were realized for the following engines:

F404 - Transition from full scale development to Component Improvement Program completed in FY 1981. Results from TF-2 accident investigation evaluated for rotor component fixes. Various service-revealed difficulties identified which required engineering support, including design changes and material substitution for turbine component life improvement and fixes for variable exhaust nozzle and afterburner fatigue, mechanical vibration and control systems. Program to reduce throttle sensitivity completed. 735 hours of full scale engine testing and 103,000 cycles of component low cycle fatigue testing accumulated.

F402 - Qualification of improved low pressure compressor vane, aluminum intermediate casing and faster engine acceleration times for reduced engine stagnation potential and frequency of fuel control adjustment. Initiated testing of shrouded low pressure turbine to establish design integrity and 1000 hour full scale engine testing (FY 1981 through FY 1983) for AV-8B aircraft. Program involves a systematic series improvement of basic F402/AV-8A engine configuration.

TF30 - Completed development and testing of the TF30-P-414A component improvement package. Goals of increased engine refurbishment interval from 1100 hours to 2400 hours and minimum-part low cycle fatigue life from 500 to 3000 hours have been verified. Stall rate and hot section inspection interval goals are currently being evaluated. TF30-P-408 low-cycle fatigue life assessment and 408/414 strategic materials substitution program initiated. Testing of modified P-414 outer-burner case for use on P-408 completed and verified and 450 hours full engine testing of P-408 completed.

TF41 - Completed lead-the-fleet program to remove 225/300/375 hour hot section inspection requirement and engine thrust derate. Completed oil leak reduction programs, 2000 hours engine endurance test and approval of high pressure turbine blade kits for FY84 delivery. Continued effort on Hot section Extended Life Program.

J52 - Completed nozzle cleaning program to eliminate streaking, design testing for blade flutter elimination, various low cycle fatigue programs and design changes for fuel heater leak checking. Continued investigative effort for stall rate reduction.

TF34 - Completed life extension program for temperature limiting amplifiers and engine changes for correcting salt water-induced delamination of compressor coating.

Program Element: 64268N
Title: Aircraft Engine Component Improvement Program
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Although this program continues engineering support for all engines and related hardware in the Navy inventory, a significant portion of the effort will be directed to the following engines:

F404 - Extensive full-scale engine and component spin pit testing comprise major program effort in FY82. Continued work on blade and rotor material substitution and control system problems. Primary effort on turbine nozzle, variable exhaust nozzle afterburner and combustor vibration are expected to be completed.

F402 - Major effort will be directed towared completing development of shrouded low pressure turbine and continuing cyclic endurance testing for AV-8B final engine confiuration. Other programs include improving turbine stator cooling and rotor blade creep life.

TF30 - Twenty-four hundred hour mission endurance test will be conducted to support problem avoidance and redesign verification effort. Specific problem areas to be addressed include catapult launch stalling/afterburner blowout, smoke emission and low cycle fatigue life of rotating components of A-7 engine configuration.

TF41 - Major emphasis will be on improvements to high-pressure turbine vane, combustion liner and discharge nozzle and final approval of remaining Hot section Extended Life Program kits. Approximately 1700 test hours are planned for 1982.

J-52 - Evaluate problems and potential solutions for rotor, guide vane and compressor stator inner shroud cracking and turbine exhaust case mount rail and fairing repairs. Low-cycle fatigue analysis and combustor redesign program to be initiated.

TF34 - Life testing effort to be increased to maintain leadtime margin over fleet hardware. Redesign effort for first stage compressor blades and validation of updated repair procedures will be continued.

3. (U) FY 1983 Planned Program: Engineering support is planned for the following types of effort: (1) rapid analysis and solution of service problems, (2) agressive mission testing of engines and components for early detection of deficiencies to minimize service problems and to extend initial parts lives, and (3) design and test verification of requied improvements. The following engines, in order of funding, will be supported during FY 1983:

Engine Model	Aircraft Application	Major Effort
F404	F-18	Accelerated mission testing and correctional engineering programs addressing functional and durability problems. Major Efforts: 2000 hrs of endurance and performance testing and component life verification, turbine blade and rotor improvment, vibration control and control system redesigns.

Program Element: 64268N
DoD Mission Area: 235 - Naval Warfare Support

Title: Aircraft Engine Component Improvement Program
Budget Activity: 4 - Tactical Programs

Engine Model	Aircraft Application	Major Effort
F402	AV-8	Initiate 1000 hr accelerated mission testing program validating final AV-8B engine configuration and verifying attainment of maintenance and reliability goals. Continued engineering support for identified service revealed difficulties. Joint US/UK program funding and management.
TF30	F-14,A-7	Conduct 2000 hrs of accelerated mission testing with TF30-P-414A entering F-14 fleet. Engineering support for low cycle fatigue and smoke emission problems, strategic material substitution, burner and transition duct improvement, and catapult launch stalls/afterburner blowout problem resolution.
TF41	A-7	Complete high pressure turbine vane, combustor liner and discharge nozzle fixes and continue effort to extend hot section component life. Complete testing of redesigned low pressure compressor rotor. Conduct approximately 1700-1800 hours of engine testing.
TF34	S-3	Continue evaluation of operational failures readiness and safety-related problems. Continue component life testing and verification.
T700	SH-60B	Initiate Component Improvement Program effort for approximately 500 hours of accelerated testing and for correctional engineering programs addressing functional & durability problems. Verification of performance margins, extension of rotating component life, airflow improvement and analysis of material substitution potential.
J52	A-4,A-6	Continue evaluation of component life and potential failure modes. Combustion chamber redesign for 750-1000 hrs hot section inspection goal.
T58	H-2, H-3, H-46	Continue engineering support for service revealed difficulties and component life extension, evaluation of low cycle fatigue, repair and inspection procedures and hardware testing.
T56	P-3,C-130,E-2,C-2	Continue engineering support for service revealed difficulties, component life extension and material durability. Emphasis on sustaining material and hardware availability for logistic support.

Program Element: 64268N
DoD Mission Area: 235 - Naval Warfare Support

Title: Aircraft Engine Component Improvement Program
Budget Activity: 4 - Tactical Programs

Engine Model	Aircraft Application	Major Effort
T64	H-53	Continue engineering support for service revealed difficulties, life-critical component evaluation, investigation of safety and flight readiness problems and component testing.
J79	F-4	Continue minimum support for service revealed difficulties. Emphasis on redesigned temperature amplifier.
T400	H-1	Continue engineering support for service revealed difficulties. Component life extension for hot section components, gas generator and high speed bearings.
T76	OV-10	Continue investigation of operational readiness and safety of flight problems. Turbine rotor life verification, endurance testing and engineering support for problems revealed through fleet introduction of T76-G-420/421.
J85	F-5,T-2	Continue component life verification and repair procedure development. Engineering support for service revealed difficulties, including afterburner igniter lead replacement.
T1820	C-1,S-2,T-28	Continue minimum support for service revealed difficulties and overall materials and service logistics.

4. (U) FY 1984 Planned Program: Engineering effort will include the following areas in conducting a component Improvement Program for each engine and related hardware: (1) rapid analysis and solution of service problems, (2) agressive mission testing of engines and components for early detection of deficiencies in the test cell to minimize service problems and to extend initial parts lives, and (3) design and test verification or required improvements. Continuation of T700 component improvement program and increased F402 testing effort are major program items for 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: 64301N
Title: MK-92 Fire Control System
DoD Mission Area: 231 - Anti-Air 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	(20,087)*	17,701	9.628	14,445	Continuing	Continuing
S0179	MK-92 Fire Control System Upgrade	(20,087)*	17,701	9,628	14,445	Continuing	Continuing

* S0179 funded in element 64652N: Gun System Improvement Program in FY 1981.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports improvements to the MK 92 Fire Control System installed on FFG-7 class frigates, PHM-1 Class Hydrofoil Patrol Boats and WMEC-270 Coast Guard Cutters, and is associated with missile and/or gunfire control depending on the installation.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development of weapons compatibility, reliability, and maintainability improvements to ensure system performance is consistent with ship/mission requirements. Continue design and development of a coherent receiver/transmitter. Complete assessment of requirements for a major mid-life upgrade for the FFG-7 Class frigates (49 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 PROGRAM ELEMENT 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 1982, a decrease of $21 due to 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	*	*	17,722	TBD	Continuing	Continuing
S0179	MK-92 FCS Upgrade	*	*	17,722	TBD	Continuing	Continuing

* S0179 Funded in element 64652N Gun System Improvement Program prior to FY 1981.

Program Element: 64301N
DoD Mission Area: 231 - Anti-Air Warfare

Title: MK-92 Fire Control System
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
SCN (MK 92 Fire Control System)	97,178	64,160	51,206	54,483	257,497	980,470
OPN (MK 92 Fire Control System)	4,203	2,464	5,211	7,329	Continuing	Continuing

Program Element: 64301N
DOD Mission Area: 231 - Anti-Air Warfare

Title: MK-92 Fire Control System
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPION: The MK-92 Fire Control System is a lightweight multi-purpose gun/missile fire control system in use in the Navy's FFG-7 Class Frigates, PHM-1 Class Patrol Hydrofoil and Coast Guard WMEC-270 Class ships. On the FFG-7 Class Frigates, it is designed to control the 76mm/62-caliber dual purpose gun and SM-1 (Medium Range) missiles against both air and surface targets, and to provide targeting information for the HARPOON Weapon System. On the PHM-1 Class hydrofoils, it provides gun control to the 76mm gun and targeting information for the HARPOON Weapon System. Initial Operational Test and Evaluation was successfully completed and Approval for Service Use obtained in FY 1976. Systems compatibility, reliability and performance improvements to correct deficiencies incurred in fleet introduction/Follow-on Test and Evaluation have been identified and tested. Ordnance Alterations production has been initiated.

(U) RELATED ACTIVITIES: Foreign Military Sales Case #SR-SAS-P4 Saudi Naval Expansion Program; PE 64602N Gun Ammunition Improvement Program; PE 24294N Guided Missile Frigate.

(U) WORK PERFORMED BY: Contractors: Sperry Rand, Great Neck, NY; Applied Physics Laboratory, John Hopkins University, Laurel MD; Automation Industries, Vitro Laboratories, Silver Springs, MD; In-house: Naval Surface Weapons Center, Dahlgren, VA; Naval Ships Weapons Engineering Station, Port Hueneme, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 Prior Accomplishments: Successfully completed Technical and Operational Evaluation and obtained Approval for Service Use in 1976. Daily Systems Operability Testing approved. Follow-on test and evaluation conducted. System effectiveness study for near term/mid term performance, reliability and maintainability improvements conducted. Commenced development of compatibility, reliability and maintainability improvements. Began near-term improvements to correct deficiencies noted during fleet introduction. Commenced performance improvements[redacted] Commence an at-sea testing program to verify improvements and Ordnance Alterations.

2. (U) FY 1982 Program: Continue development of weapons compatibility, reliability and maintainability improvements. Commence design and development of a coherent transmitter. Initiate refurbishment of the MK-92 Fire Control System Engineering Development Model. Start computer program update. Conduct trade-off and system requirements studies which will lead to system performance specifications and requests to industry for proposals on a MK-92 mid-life major upgrade for the FFG-7 Class.

3. (U) FY 1983 Planned Program: Complete engineering development of the coherent transmitter and digital signal processor. Complete integration into the Engineering Development Model for testing. Commence design and engineering to improve the Weapons Direction System Scheduler. Continue development of a major upgrade for the FFG-7 Class. Continue computer program update.

Program Element: 64301N
DOD Mission Area: 231 - Anti-Air Warfare

Title: MK-92 Fire Control System
Budget Activity: 4 - Tactical Program

4. (U) FY 1984 Planned Program: Continue computer program update. Test and evaluation to be conducted at Land Based Test Site and at sea on coherent receiver/transmitter and digital signal processor. Continue development of a major upgrade for the FFG-7 Class.

5. (U) Program to Completion: Complete reliability and performance improvements. Complete at-sea testing of the coherent transmitter. Complete longer term system upgrade for the FFG-7 Class based on mission, budget and threat considerations.

6. (U) Milestones. Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
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	16,807	34,196	8,158	8,376	86,103	712,800
S0165	AEGIS	11,124	10,394	8,158	8,376	86,103	712,800
S0324	Battle Group Anti-Air Warfare Coordination	5,683	0	*	*	*	*
S1275	SPY-1 Radar	+	18,862	**	**	**	**
S1447	AEGIS Product Improvements	—	4,940	**	**	**	**

* Project S0324 Battle Group Anti-Air Warfare Coordination is transferred to Program Element 63382N in FY 1983. See PE 63382N for detailed description of that program.

** Project S1275 SPY-1 Radar Improvements and S1447 AEGIS Product Improvements are transferred to Program Element 64307N in FY 1983. See PE 64307N for detailed description of those programs.

+ Congress appropriated $40 million under Program Element 63589N Major Surface Combatant Development Project S1558 AEGIS Product Improvement (Advanced) for an FY 1981 start to SPY-1 Radar Improvement Project.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Fleet of the 1980's must be capable of operating in a multi-threat environment of long-range, high powered jammers screening coordinated, high density, anti-ship missile attacks. Prior funding for this program element provided for the development of the AEGIS shipboard area air defense system to provide the short reaction time, high firepower, continuous weapons availability and immunity to electronic countermeasures necessary to protect the Battle Group in the face of that growing Soviet threat. The funds currently budgeted in this element provide for the operation and maintenance of AEGIS Engineering Model-1 in USS NORTON SOUND for testing purposes, and the development of a Digital Automatic Test Set to be resident at an AEGIS-unique depot.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Support AEGIS Engineering Development Model-1 in USS NORTON SOUND for AEGIS Weapon System, Vertical Launch, STANDARD Missile, and Battle Group Anti-Air Warfare Coordination testing. Continue development and verification of computer programs for Depot Automatic Test Equipment to test and analyze repairable printed circuit boards and analog chassis. The significant decrease in funding between FY 1982 and FY 1983 (-26,038) is due to the transfer of Projects S1275, SPY-1 Radar Improvements, and S1447, Combat System Improvements, to PE 64375N and PE 64307N, respectively. The above funding includes outyear escalation and encompasses all development phases now planned or anticipated.

Program Element: 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
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 from 1) the President's Revised Budget in March 1981, using new inflation indices, 2) across-the-board Congressional imposed reductions in Navy travel and Contract Support Services, and 3) additional inflation-related cuts. FY 1981: Project S0324 Battle Group Anti-Air Warfare Coordination, a decrease of 148 for travel reductions; Project S0165 AEGIS, an increase of 300 due to the President's Revised Budget and subsequent decrease of 364 for travel and 4 for inflation. In addition, 209 was reprogrammed to the 5" Gun Program Element 64608N Project S0305. Project S0854 Stand-Off Jammer Suppression was transferred to Program Element 63536N. FY 1982: a decrease of 248 in Project S0165 AEGIS, a decrease of 360 in Project S1275 SPY-1 Radar Improvements, and a decrease of 118 in Project S1447 AEGIS Product Improvement due to minor program cost adjustments including escalation. FY 1983: Project S0165 AEGIS, a decrease of 364 due to minor cost adjustments including escalation. Projects S1275 and S1447 were transferred to Program Element 64307N, resulting in an overall decrease of 24,312.

(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	14,435	23,449	34,922	32,470	Continuing	Continuing
S0165	AEGIS	8,349	11,392	10,642	8,522	TBD	TBD
S0324	Battle Group Anti-Air Warfare Coordination	6,086	5,831	0	0	Continuing	Continuing
S1275	AEGIS Product Improvements	—	**	19,722	10,147	Continuing	Continuing
S1447	Combat System Improvements	—	—	5,058	13,801	Continuing	Continuing
S0854	Standoff Jammer Suppression	—	6,226	*	*		

* Project S0854 Standoff Jammer Suppression was transferred to Program Element 63536N Standoff Jammer Suppression in FY 1982.

** Congress appropriated $40 million under Program Element 63589N Major Surface Combatant Development Project S1558 AEGIS Product Improvement (Advanced) for an FY 1981 start to AEGIS Product Improvement Project.

Program Element: 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
SCN (AEGIS CG-47)						
Quantity	1,911,900 (2)	2,997,400 (3)	3,134,400 (3)	3,340,600 (3)	Continuing	Continuing

Program Element: 64303N
Title: AEGIS
DoD Mission Area: 231 - Anti-Air Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The threat posed to the Battle Group and Fleet by Soviet offensive anti-ship missile capability has necessitated a quantum upgrade in Anti-Air Warfare capability. That Fleet must be able to operate in a sophisticated, multi-threat environment characterized by coordinated saturation attacks of long-range, anti-ship missiles launched from bombers, submarines, surface ships and boats under cover of massive electronic countermeasures. In December 1969, RCA was awarded a contract to engineer an advanced third generation advanced Anti-Air Warfare System now known as the AEGIS Weapon System. The AEGIS Weapon System today is a high-performance Shipboard Area Air Defense System which features rapid reaction, high firepower, long range, high reliability and performance. The heart of the system is the AN/SPY-1A, multi-function, phased array radar which detects the target, provides target tracking solutions, and transmitts midcourse guidance commands to STANDARD Missiles in flight. The AEGIS Weapon System forms the "core" of the combat system for all AEGIS ships. The current class in construction is the CG-47 Class. The AEGIS Combat System directs all the elements of the ship's combat system to conduct Anti-Air Warfare, Anti-Submarine Warfare, Anti-Surface Warfare, and Surface Strike nonultaneously. Project S0165 AEGIS: provided funds for the development of the AEGIS Weapon System. Currently provides for the integration of the Vertical Launching System with AEGIS Engineering Development Model-1 in USS NORTON SOUND, the upgrade of Engineering Development Model-1 to AEGIS Engineering Model-1, the support of Engineering Development Model-1 in USS NORTON SOUND for testing, and the development of automatic test equipment for use at an AEGIS depot. Project S1275 SPY-1 Radar Improvement: provides funds for upgrade to the AEGIS Weapon System, primarily to the SPY-1A radar, using latest technology. In FY 1983, Project S1275 is transferred to Program Element 64375N and a description of this project may be found in that Descriptive Summary. Project S1447 AEGIS Product Improvements: provides for upgrading the AEGIS Combat System, initially developed under Program Element 64304N Combat System Engineering Development Site, to take advantage of maturing equipment higher technology and systems developed elsewhere. In FY 1983, Project S1447 is transferred to Program Element 64307N and a description of this project may be found in that Descriptive Summary. Project S0324 Battle Group Anti-Air Warfare Coordination: This project is being executed to build on AEGIS capability and to provide direction of Battle Group Anti-Air Warfare from the AEGIS cruiser. In FY 1983 Project S0324 is transferred to Program Element 63382F and a description of this project may be found in that descriptive summary.

(U) RELATED ACTIVITIES: Program Element 64304N, Combat System Engineering Development Site, Program Element 64366N, STANDARD Missile Improvement, Program Element 64353N, Vertical Launch System; Program Element 63536N, Standoff Jammer Suppression, Program Element 63585N, Major Surface Combatant Development.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA; Fleet Combat Direction System Support Activity, San Deck, VA and San Diego, CA, Pacific Missile Test Center, Point Mugu, CA; Long Beach Naval Shipyard, Long Beach, CA. Contractors: RCA, Moorestown, NJ (Prime Contractor), Raytheon Company, Wayland, MA; Computer Sciencies Corporation, Moorestown, NJ, Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; MITRO Laboratory, Silver Spring, MD; Bird Associates, Vienna, VA.

Program Element: [illegible] Title: AEGIS
DoD Mission Area: [illegible] Anti-Air Warfare Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. ([illegible]Y 1981 and Prior Accomplishments: Project S0165 AEGIS: All AEGIS Weapon System performance requirements were successfully demonstrated during the Engineering Development Program. AEGIS Engineering Development Model 1 concluded a most exacting test program, initially at a land-based test site and subsequently at-sea in USS NORTON SOUND. The at-sea testing included 23 out of 30 successful STANDARD Missile-1 firings against stringent target presentations, which simulated current and future threats. The Navy Preliminary Evaluation verified that the system could be operated and maintained by sailors. Additional components and modified computer programs were added to the Development Model for testing of the AEGIS Weapon System with STANDARD Missile-2. These tests validated the ability of the AEGIS/STANDARD Missile-2 to detect, schedule, and control multiple simultaneous engagements. As a result of these at-sea tests, signficant design simplifications, and weight and cost reductions were incorporated into Engineering Development Model-3C installed at the AEGIS Combat Systems Development Site ashore. On 19 January 1978, the Defense System Acquisition Review Council approved the production of the AEGIS Weapon System and the Guided [illegible] Destroyer DDG-47, (now changed to the Guided Missile Cruiser CG-47) Class. The production contract for the first AEGIS System was awarded to RCA Corporation on 14 April 1978 and three follow on systems are now in production Engineering of the AEGIS Weapon System continued to incorporate certain near-term improvements to the AN/SPY-1 Radar and to develop additional vendor sources for AEGIS components. Support also continued for USS NORTON SOUND for at-sea tests of AEGIS, STANDARD Missiles and Vertical Launching System. The NORTON SOUND Engineering Development Model-1 was upgraded to AEGIS Engineering Model-1. Project S0324 Battle Group Anti-Air Warfare Coordination Project: For prior work accomplished under this project see the Descriptive Summary for Program Element 63382N Battle Group Anti-Air Warfare Coordination. Project S1275 SPY-1 Radar Improvements: For prior work accomplished under this Project see the Descriptive Summary for Program Element 64375N SPY-1B Radar.

2. (U) FY 1982 Program: Project S0165 AEGIS: Continue support of USS NORTON SOUND for continued testing of AEGIS, the Vertical Launch System, STANDARD Missile and Battle Group Anti-Air Warfare Coordination. Initiate development of automatic test equipment for use at Navy Depot. Project S0324 Battle Group Anti-Air Warfare Coordination: For work accomplished under this project, see Descriptive Summary for Program Element 63382N Battle Group Anti-Air Warfare Coordination. Project S1275 SPY-1 Radar Improvement: For work accomplished under this project, see Descriptive Summary for Program Element 64375N SPY-1B Radar. Project S1447 Combat System Improvements: For work accomplished under this project, see Descriptive Summary for Program Element 64307N CQ 47/AEGIS Product Improvement.

3. (U) FY 1983 Planned Program: Project S0165 AEGIS: Continue support for AEGIS Engineering Model 1 in USS NORTON SOUND for continued testing of the AEGIS, STANDARD Missile, and Battle Group Anti-Air Warfare Coordination and Vertical Launch System. Continue development of Depot Automatic Test Set computer programs.

Program Element: 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Project S0165 AEGIS: Continue support for AEGIS Engineering Model-1 in USS NORTON SOUND for continued testing of AEGIS, STANDARD Missile-2, Battle Group Anti-Air Warfare Coordination and Vertical Launch System. Continue Development of Depot Automatic Test computer programs.

5. (U) Program to Completion: Project S0165 AEGIS: Continue test and operational support of AEGIS Engineering Model-1 in USS NORTON SOUND for testing new AEGIS Combat System modification including STANDARD Missile Block II, TOMAHAWK, and Link modifications. Complete Depot test set development.

6. (U) Milestones:

Milestones:	Date
a. Defense System Acquisition Review Council II - AEGIS	December 1969
b. Award Engineering Development Contract	December 1969
c. Complete Fabrication of Engineering Development Model-1	July 1972
d. Defense System Acquisition Review Council IIA	June 1974
e. Complete Development IIIA AEGIS STANDARD Missile-2 Medium Range	May 1977
f. Complete Initial Operational Test and Evaluation IIIA AEGIS/STANDARD Missile-2	July 1977
g. Defense System Acquisition Review Council III	January 1978
h. Complete AEGIS System Level tests at Combat System Engineering Development Site	May 1979
i. Support STANDARD Missile/Vertical Launching System Firings	September 1981 - March 1982
j. Depot Automatic Test Equipment Procurement	February 1982
k. Automatic Test Equipment Capability	May 1988

7. (U) TEST AND EVALUATION DATA. Described in detail under Project S0165 AEGIS.

Program Element 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: AEGIS Weapon System Engineering Development Model-1 is a partial system which was fabricated for at-sea testing. The elements of Engineering Development Model-1 underwent stringent performance and environmental qualification testing prior to installation in a Land Based Test Site Located at Moorestown, N.J. Land based testing was completed in November 1973 and Engineering Development Model-1 was installed in USS NORTON SOUND. In parallel with Engineering Development Model-1 Land Based testing, the Guided Missile Launching System MK 26 MOD 0 successfully completed a factory functional integration test, a factory reliability test, and preliminary evaluation in USS NORTON SOUND. Also in parallel, STANDARD Missile-2 Medium Range development testing was conducted at White Sands Missile Range with 18 missile firings conduted between October 1972 and September 1976. Continuous phases of testing have occured since Engineering Development Model-1 was installed in USS NORTON SOUND. To date, 37 STANDARD Missile-1's have been fired at sea. In all instances the AEGIS shipboard system performed as required: 28 missiles intercepted the target within lethal range; and 9 unsuccessful intercepts were caused by missile-related failures. STANDARD Missile 1 firings were made against target drones, TALOS Low Altitude Supersonic Targets, aand BOMARC missiles, all of which are representative of known threats. During FY 1975/6 Engineering Development Model-1 was upgraded with a STANDARD Missile-2 Medium Range capability by adding additional equipment and computer programs. Comprehensive at-sea system testing of AEGIS and STANDARD Missile-2 was conducted in 1977-1978. AEGIS Development Test-IIIA and STANDARD Missile-2 compatibility/firepower tests were successfully conducted between December 1976 and May 1977. Of the 9 STANDARD Missile-2s fired, 6 successfully intercepted the targets. All AEGIS/STANDARD Missile-2 compatibility technical goals were successfully demonstrated. One test of note was a very successful high firepower scenario against [ ] BQM-34 targets. Additional tests were conducted during FY 1978. Included in these tests were the evaluation of Moving Target Indicator and Electronic Counter Countermeasures design improvements, demonstration of MK 26 Guided Missile Launching System rapid fire capability and successful STANDARD Missile-2 firings against [ ]. All STANDARD Missile-1 and STANDARD Missile-2 firings were conducted by the USS NORTON SOUND Navy crew.

Engineering Development Model-3C is an improved version of Engineering Development Model-1 in USS NORTON SOUND. It has been installed at the Combat System Engineering Development Site, Moorestown, N.J. AEGIS Intermediate milestone-1 testing was conducted with this model in November 1978. During a 48 hour period AEGIS MK-7 Weapon System was manned by Navy personnel and exercised by real and simulated targets. All objectives and thresholds were achieved. Development Test-IIIB was conducted at Combat System Engineering Development Site on 16-19 May 1979, and the system was certified ready for Operational Test-IIIB. During this 48 hour exercise the Combat System Engineering Development Site was manned and maintained by Navy personnel. AEGIS Intermediate Milestone-2 was conducted at Combat System Engineering Development Site in January 1980, demonstrating the Weapon System's capability to detect, track and engage targets. All objectives were achieved. AEGIS Intermediate Milestone-3 was conducted in August 1980. The program consisted of __ hours of simultaneous warfare engagements in Anti-Air Warfare, Surface Warfare and Anti-Submarine Warfare, in clear and adverse environments. All objectives were accomplished. Development Test - IID (formerly DT-IIID) was conducted at the Combat System Engineering Development Site Site from 5 to 8 January 1981. Simulated

Anti-Air Warfare, Surface Warfare and Anti-Submarine Warfare engagements were conducted with various weapon options against single and multiple targets scenarios. Anti-Air Warfare engagements were conducted utilizng STANDARD Missile-2 missiles[, Surface Warfare engagements were accomplished utilizing STANDARD Missile-2 and Harpoon. ASROC and over-the-side torpedo engagents were conducted on underwater threats presented by the Sonar Environmental Group Simulator. Underwater engagements (beyond ownship weapon envelope) were conducted utilizing P-3C aircraft. Controlled aircraft simulations of hostile missile profiles were provided by F-4, F-14, A-4 and Lear jet aircraft. Electric countermeasures environments were presented by the NKC-135A and EA-6B aircraft. Various mixtures of Self-screening and standoff jamming and fighter assets were utilized in presenting Electronic Countermeasures scenarios with mainlobe and sidelobe screening. F-4 and F-14 aircraft were employed to intercept targets. All Anti-Air Warfare engagements were validated by automatic Identification Friend or Foe Mode IV interrogations. Engagement orders were generated manually and automatically through implementation of Weapon Selection doctrine. Raid sizes ranged from[controlled aircraft and/or [drone targets. Operations were conducted in a Battle Group environment. Link-4 was utilized between CSED Site and other participating units including USS DAHLGREN (DDG-43), USS BRISCOE (DD-977), E-2C, P-3C and Fleet Combat Direction System Support Activity, Dam Neck, VA. Simultaneous multi-warfare engagements were conducted to assess performance of Navy watch sections in utilizing standardized procedures.

2. (U) Operational Test and Evaluation: Initial operational test and evaluation was conducted by Commander Operational Test and Evaluation Force during June and July 1977 in USS NORTON SOUND. It was determined that the AEGIS Weapon System has the potential to be operationally effective and operationally suitable. As a result of the 1977 tests Commander Operational Test and Evaluation Force determined that Engineering Development Model-1 performance (detection, tracking, and engagement success rate) offers a significant increase in operational capability over existing fleet systems. [ ] due to the early design state of Engineering Development Model-1, were the major constraints on system effectiveness. Seven missiles were fired during 12 firing engagements[ ] For the purpose of comparing test results to threshold requirements of how many successes of success rate, the last engagement was not counted. The probability of successfully engaging, Pz, (firing order to intercept, single shot with STANDARD Missile-2, nominally clear environment), was demonstrated as 0.67 with an Operational Test-IIIA threshold of 0.66. This represents the ratio of targets killed to targets fired upon. For non-warhead configured missiles, warhead effectiveness is assumed if missile successful intercept criteria is satisfied for a specified warhead. [ ]runs were used to conduct nonfiring engagements in clear and electronic countermeasures (active and passive) environments. Reliability and maintainability results were better than thresholds during 478 hours of operation by the crew of USS NORTON SOUND. All Engineering Development Model-1 faults that were detectable by

the Operational Readiness Test System were detected; these represented 44% of the faults that occurred. During these tests in USS NORTON SOUND, the system was operated and maintained by the Navy crew. Based on the results of these tests and the recommendation of Commander Operational Test and Evaluation Force, Provisional Approval for Service Use was granted.

Initial Operational Test and Evaluation was continued 20-23 May 1979 (Operational Test IIIB) at the Combat System Engineering Development Site, Moorestown, N. J. The full AEGIS Weapon System MK 7 Mod 3 was represented by a combination of installed equipment (Engineering Development Model 3-C), equipment simulators, and/or computer program simulations. The AEGIS Weapon System was exercised in simulated Anti-Air Warfare engagements against single and multiple threats. Over 400 simulated engagements were conducted against A-4 and F-14 aircraft, simulated targets, and targets of opportunity. Raid size varied from 1 to 12, with most raids of size one, two, three, or six. [ ] With the AN/SPY-1A Radar System on-line, these simulated and real targets were superimposed. Pse2 is the same as Pse1 using real targets except that a simulated missile program in AN/SPY-1 is used in place of actual missile firing. [ ] The failures were due to a single computer system malfunction which resulted in 3 failures. Pse3 is the same as Pse2 except that the target is simulated. [ ] With the AN/SPY-1A on-line six simultaneous engagements occurred (maximum number due to design limit of the number of simulated missiles). The radar system was replaced with a SPY-1A simulation for tests requiring [ ] simultaneously arriving targets. Using the AN/SPY-1A simulation, [ ] Two reliability criteria are used: mean time between (critical/major) events which is mostly equipment and mean time between (critical/major) interrupts which is mostly computer programs. Mean time between (critical/major) events data were collected from 2 January to 23 May 1979 and projected, using a simulation, to three AEGIS Weapon System configurations in CG-47. Results were [ ] for a one Guided Missile Launching System and three fire control system channels configuration: [ ] for a one Guided Missile Launching System, four Fire Control System channels configuration; [ ] for a two Guided Missile Launching System, four Fire Control System channels configuration. Logistic supportability and maintainability were evaluated. Commander Operational Test and Evaluation Force concluded that the AEGIS Weapon System is potentially both operationally effective and operationally suitable, that the planned maintenance system (which included the Operational Readiness Test System) criteria are not adequate to permit a high level of operational availability. Commander Operational Test and Evaluation Force recommended procurement of all six systems covered by the current Provisional Approval for Service Use and consideration of alternative provisioning criteria. Operational Evaluation Report for OT-IIIB was approved December 1979.

Initial Operational Test and Evaluation was continued through October 1980 (OT-IIC; formerly OT-IIIC). The purpose of the evaluation was to assess the potential operational suitability of the AEGIS Weapon System and AEGIS Combat System. Data collected during AEGIS Intermediate Milestone-2 testing (January 1980), AEGIS Intermediate Milestone testing (August 1980), and during Development Test and Evaluation at CSEDS (January 1979 through September 1980) were used. Commander, Operational Test and

Program Element 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
Budget Activity: 4 - Tactical Programs

Evaluation Force assessed reliability, maintainability, availability, and logistic supportability factors and assessed the capability of the AEGIS Combat System to control and integrate information for individual elements. Commander, Operational Test and Evaluation Force determined the AEGIS Combat System to be potentially operationally suitable. Initial Operational Test and Evaluation was completed February 1981 (OT-IID: formerly OT-IIIB). During operations conducted at CSEDS 9-12 February 1981, the AEGIS Combat Systm and AEGIS Weapon System were exercised in simulated multi-warfare engagements including Anti-Air Warfare, Surface Warfare, and Anti-Submarine Warfare singly and in combinations. Over 300 simulated engagements were conducted against both aircraft and simulated targets. EA-6Bs and an NKC-135 provided low and high-power threat-representative jamming in both stand-off and self-screening jamming roles. Link-11 operations were conducted with USS CALIFORNIA (CGN-36) and E-2c aircraft. Air control and Link 4A operations were conducted with F-14's. Anti-Submarine Warfare air control was conducted with S-3 and P-3c aircraft. SUCAP operations using A-6Rs were conducted. Constructive submarines and surface units were also used in the scenarios. The AEGIS Combat System demonstrated a capability to control and integrate information from individual elements for Anti-Air Warfare, Surface Warfare, Anti-Submarine Warfare, Command-Control-Communications, and Electronic Warfare. While conducting Anti-Air Warfare with live targets and simulated STANDARD Missiles, a PSE2 of [ ] was demonstrated. While no PSE3 criteria were established, impressive capability was demonstrated against simulated Anti-Ship Missiles. A capability was demonstrated against simulated Anti-Ship Missiles. A capability to control [ ] simulated STANDARD Missile-2 Missiles in simultaneous flight was demonstrated. Reaction time for clear environment engagements was calculated to be as low as [ ]. Reaction time for adverse environment was calculated to be as low as [ ]. The AN/SPY-1A radar detected and tracked all manned aircraft presentations in both clear and adverse environments. The AEGIS Combat System was assessed to have satisfactory passive and active survivability features. Using the same reliability criteria and methodology as OT-IIIB (except with a data base collected from 2 January 1979 to 12 February 1981) the CG-47 AEGIS configuration MTB (C/M)E were: 147.5 hours (criterion: greater than or equal to 55 hours) for a one Guided Missile Launching System and three Fire Control System configuration; 31.4 hours (criterion: greater than or equal to 16 hours) for a one Guided Missile Launching System and and Fire Control System configuration; 13.3 hours (criterion: greater than of equal to 8.5 hours) for a two GMLS and four FCS configuration. The demonstrated MTB (C/M) 1 during OT-IID was 1.03 hours (criterion: greater than or equal to 5.5 hours). A maintainability assessment resulted in a demonstrated Mean Time To Repair - I (geomentric mean time to restore interrupts) of 25.3 seconds (criterion: less than or equal to 24 seconds). A statistical test indicated the difference equates to sampling error. Scheduled maintenance time per 24 hours was computed to be 1.15 hours (criterion: less than or equal to 2.5 hours). Restoration time: 2 minutes (riterion: less or equal to 12 minutes), from scheduled maintenance; 0 minutes (criterion: less than or equal to 3 minutes) from system test.

Follow-on Operational Test and Evaluation will be conducted at CSEDS and in CG-47. OT-IIIA at CSEDS (3rd Quarter FY 82) will assess the operational effectiveneess and suitability of changes identified in OT-IID testing. OT-IIIB will be conducted at sea in CG-47 during 4th Quarter FY 1983. (Live missile firings will be conducted in various scenarios including multiple target

presentation Probabilities of successful engagements and simultaneous engagement capability will be among the system performance characteristics assessed). OT-IV will be conducted at-sea in CG-47 in FY 84 to verify system additions and modifications made during the most shakedown availability.

An evaluation concerning logistic support and availability showed that an altenative sparing strategy to the current Navy sparing policy (FLSIP) could yield significantly increased levels of operatonal availability. Commander, Operational Test and Evaluation Force concluded that: the AEGIS Weapon System is potentially operationally effective and suitable; the AEGIS Combat System has the potential to be operationally effective and suitable; FLSIP provisioning criteria will not maintain a high level of operational availability. Commander, Operational Test and Evaluation Force recommended: continued procurement, installation, program planning and testing of the AEGIS Combat System, in accordance with the approved AEGIS program; improvement of computer program performance and reliability; provision of complete and accurate technical documentation; use of a provisioning system that will ensure a higher availability than provided FLSIP. Operational Evaluation Report for OT-IID was approved 23 June 1981.

3. (U) System Characteristics

Characteristics	Unit of Measure	Objective	Demonstrated* Performance
Total Number of Simultaneous Engagements			
Mid-course	ea		
Terminal	ea		
Total Number of Targets Automatically Tracked	ea		
Detecton-To-Fire Time Against Surprise Targets			
-Clear Environment (Automatic Mode)	sec		
-Electronic Countereasures			
-Self Screening Jammer	sec		
-Stand-Off Jammer 100W/MMHZ/M2 Sidelobe	sec		
-Fully Automatic Mode with Heavy Natural Clutter	sec		
Availability over 66 months	%		
Intercept Range (20k ft - 55k ft, Mach 0.2 - 2.0)	NM		
Intercept Range Against BQM-34 Target at 200 ft.	NM		
Miss Distance (Std. Dev.)			
Clear Environment	FT		
6g Target Maneuvering at 40k ft alt	FT		
MAX Crossing Target Range for BQM-34, 200 ft. alt Target	NM		

Program Element 64303N
DoD Mission Area: 231 - Anti-Air Warfare

Title: AEGIS
Budget Activity: 4 - Tactical Programs

*Demonstrated Performance data represent the evaluation of Engineering Development Model-1 at-sea in USS NORTON SOUND with STANDARD Missile-1 except where STANDARD Missile-2 indicated.

**Occurred during Development Test/Operational Test IIIB at the Combat System Engineering Development Site in May 1979 using the Interface Simulator System and Engineering Development Model-3C.

***[ ] target tracking capability represents the number of system tracks which AN/SPY-1A is itself capable of transmitting across the computer interface to the command and control track file. AN/SPY-1A is itself capable of carrying [ ] air tracks in its own file. The margin is provided in order to prevent overload of the radar computer in the presence of large numbers of long range tracks of limited interest to command or in the presence of transient spurious tracks caused by clutter or interference.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64304N
Title: Combat System Engineering Development Site
DoD Mission Area: 231 - Anti-Air 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	26,262	16,056	12,232	5,558	8,586	321,708
S0325	Combat System Engineering Development Site	26,262	16,056	12,232	5,558	8,586	321,708

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDS: The engineering of the AEGIS Weapon System with other elements of the AEGIS Combat System is being conducted at the Navy's Combat System Engineering Development Site, Moorestown, New Jersey. The Combat System Engineering Development Program provides the facility and resources necessary to system engineer and test the AEGIS Combat System as well as to develop, proof and validate the Combat System computer programs. Combat System Engineering Development also supports the disciplined engineering approach for incorporating changes to the AEGIS Combat System baseline required to keep pace with the increasing threat. Operational Test and Evaluation of the AEGIS Combat System, planning for logistic support and crew training in support of the AEGIS Shipbuilding Program are also being conducted at the Combat System Engineering Development Site.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Combat System Engineering Development Program will continue to provide for necessary engineering of the baseline AEGIS Combat System for at least the first five ships of the CG-47 Class focusing on continuing the development of the AEGIS Display System; the integration of Light Airborne Multi-Purpose System, MK III and STANDARD Missile-2 BLK II. The above funding profile includes outyear escalation and encompasses all development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary result from: 1) the President's Revised Budget in March 1981, using new inflation indices; 2) across-the-board imposed cuts for travel and contractor support services; and 3) additional inflation related cuts. FY 1981: A decrease of 71. In addition, 200 was reprogrammed to the 5" Gun Program Element 64608N Proj. S0305 and 100 was reprogrammed to the SLQ-32 Program Element 64573N. FY 1982: A decrease of 106 due to a reduction in contractor support. FY 1983: A decrease of 597 for inflation and contractor suport plus a decrease of 1,575 to comply with budgetary constraints.

Program Element: 64304N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Combat System Engineering Development Site
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 FCR PROGRAM ELEMENT	44,847	26,633	16,162	14,404	10,160	320,373
S0325	Combat System Engineering Development Site	44,847	26,633	16,162	14,404	10,160	320,373

(U) OTHER APPROPRIATION FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
SCN - CG-47 (Formerly DDG-47) (Program Element 24292N)	1,911,900	2,997,400	3,134,400	3,340,600	Continuing	Continuing
Quantity	(2)	(3)	(3)	(3)		

Program Element: 64304N
DoD Mission Area: 2.1 - Anti-Air Warfare

Title: Combat System Engineering Development Site
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Combat System Engineering Development Site supports the engineering development and deployment of the AEGIS Combat System. In the development of the AEGIS Weapon System, a land-based facility was used to engineer, integrate and test the AEGIS Weapon System prior to installaion in USS NORTON SOUND. This procedure contributed significantly to the successful engineering development of the AEGIS Weapon System and is being repeated at Moorestown, New Jersey, to engineer the AEGIS Combat System. The Combat System Engineering Development Program provides the following: engineering and testing of an operational AEGIS combat system; computer programming for Command and Decision, Radar and Weapons Control Systems, establishment of Combat Information Center manning requirements and operator/machine interaction, tactical and maintenance doctrine development, and functional and physical integration of combat system elements. Initial CG-47 combat system crews will be trained using Combat System Engineering Development Site equipment and computer programs. Planning for this training is being accomplished under the Combat System Engineering Development Program. The Site includes most of the AEGIS Combat System, including the AN/SPY-1A phased array radar, the Command and Decision and Weapons Control Systems, external communications systems, selected simulation equipment, surface and air search radars (SPS-55 and SPS-49), Identification Friend or Foe system, and Combat System support equipment.

(U) RELATED ACTIVITIES: Program Element 64303N, AEGIS; Program Element 64508N, 2 Dimensional Air Search Radar Program AN/SPS-49, Radar Surveillance Equipment, Program Element 64211N, Aircraft Identification Monitoring System/Identification Friend or Foe MK-12; Program Element 64366N, STANDARD Missile Development; Program Element 64368N, Vertical Launch System; Program Element 64567N, Ship Development Engineering (supports the contract design of CG-47 for which Combat System Engineering Development products are an input).

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA, Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA; Fleet Combat Direction System Support Activity, Dam Neck, VA, and San Diego, CA, Pacific Missile Test Center, Point Mugu, CA. Contractors: RCA, Moorestown, NJ (Prime Contractor), Raytheon Company, Wayland, MA, Computer Sciences Corporation, Moorestown, NJ; Applied Physics Laboratory, Johns Hopkins University, Laurel, MD, VITRO Laboratory, Silver Spring, MD; Bird Associates, Vienna, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: The Combat System Engineering Development Program was initiated in February 1974 and the Combat System Engineering Development contract awarded to RCA in September 1976. The Combat System Engineering Development Site was commissioned in May 1977 and installation of AEGIS Combat System elements commenced. The AEGIS Weapon System is now installed and operational. Preparations for AEGIS Combat System Initial Operational Test and Evaluation began in FY 1978 with a series of tests simulating Independent Steaming Exercises. In November 1978, AEGIS Intermediate Milestone I evaluated AN/SPY-1A tracking performance, and in May 1979, during Operational Test-IIIB, the AEGIS Weapon System operational effectiveness was revalidated. AEGIS Intermediate Milestone 2 in January 1980, and AEGIS Intermediate Milestone 3 in August 1980 successfully demonstrated the Combat System's Anti-Air Warfare capability. In February 1981, OT-IIID was conducted to demonstrate full combat system

performance. Combat System Engineering efforts for follow CG-47 were underway in 1979 and continued into 1981 to integrate STANDARD Missile-2 Block II, the Light Airborne Multi-Purpose System MK III, Gun Weapon System and the Integrated Audio Distribution System. Engineering development of the AEGIS Display System also began in 1979. AEGIS Test Teams at Naval Surface Weapons Center, Dahlgren, VA, and Naval Surface Weapons Engineering Station, Port Hueneme, CA, were established. They will gain experience for future In-Service Engineering through participation in this program as well as in the production testing of the AEGIS Combat System. This program is continued for later ships of the class under PE 64307N, Project S1447 Combat System Improvements.

2. (U) FY 1982 Program: Complete engineering efforts suggested in Operational Test-IIID. Continue integration of Light Airborne Multi-Purpose System MK III and STANDARD Missile-2 Block II into the AEGIS Combat System. Complete integration of Gun Weapon System. Continue integration and test of AEGIS Display System. Deliver initial CG 47 Baseline computer programs to the shipbuilder.

3. (U) FY 1983 Planned Program: Complete integration of SM-2 BLK II into the AEGIS Combat System. Continue integration and test of Light Airborne Multi-Purpose System MK III and the AEGIS Display System.

4. (U) FY 1984 Planned Program: Complete integration and test of Light Airborne Multi-Purpose System MK III and AEGIS Display System.

5. (U) Program to Completion: Complete integration, engineering and testing of elements for first follow-ships of the class. Update, proof and revalidate computer programs.

6. (U) Milestones:

Milestones	Date
a. Defense System Acquisition Review Council II - AEGIS	December 1969
b. Defense System Acquisition Review Council IIA - AEGIS	June 1974
c. Award Combat System Engineering Development Site Contract	September 1976
d. Defense Systems Acquisition Review Council III - AEGIS	January 1978
e. Complete AEGIS Weapon System Demonstration, Operational Test-IIIB	May 1979
f. Start Modification of AEGIS Combat System Specifications for STANDARD Missile-2 Block II	October 1980
g. Complete Baseline Computer Program Integration and Test	January 1981
h. Combat System Integration Demonstration Operational Test - IIID	February 1981
i. Start delivery of computer programs to Ingalls	January 1982

Program Element: 64304N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Combat System Engineering Development Site
Budget Activity: 4 - Tactical Programs

Milestones		Date
j.	Start STANDARD Missile-2 Block II/AEGIS Weapon System Computer Program Integration at CSED Site (September 1982)*	October 1982
k.	Complete STANDARD Missile-2 Block II/AEGIS Weapon System Computer Program Integration at CSED Site	February 1983
l.	Complete AEGIS Display System testing	June 1984
m.	Complete Installation and Testing of Integrated Audio Distribution System	July 1984

* Date listed in the FY 1982 Program Element Descriptive Summary

Program Element: 64304N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Combat System Engineering Development Site
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA

1. (U) Development Test and Evaluation: The Combat System Engineering Development Site will be used for both AEGIS Weapon System and AEGIS Combat System Development Test and Evaluation. Results for both are reported under Program Element 64303N/Project S0165, AEGIS.

2. (U) Operational Test and Evaluation: The Combat System Engineering Development Site will be used for AEGIS Operational Test and Evaluation. Results for both the AEGIS Weapon System and AEGIS Combat System are reported under Program Element 64303N/Project S0165, AEGIS.

3. (U) Follow-Up Operational Test and Evaluation: Testing of the combat system at Combat System Engineering Development Site will be continued during the period following Initial Operational Test and Evaluation to assure that the system continues to meet operational needs and retains its effectiveness in new environments and against new threats. The Combat System Engineering Development Site will be employed to evaluate system changes to integrate and test new combat systems elements and to continue operational and maintenance testing and training.

4. (U) System Characteristics: The Combat System Engineering Development Site uses actual and simulated subsystems to provide a presentation of the AEGIS Combat System. Characteristics for these subsystems are described under Program Element 64303N/Project S0165, AEGIS.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64306N
Title: PENGUIN Combat System 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	5,892	3,658	1,623	477	0	21,350
S1241	PENGUIN Combat System Development	5,892	3,658	1,623	477	0	21,350

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The PENGUIN Combat system consists of a Weapon Control System and a short range, inertially guided, passive infra-red terminal homing anti-shipping missile system developed by the Norwegians. PENGUIN is being tested for possible installation on the 65' MK 3 Patrol Boat to provide a close-in surface-to-surface missile capability in the Amphibious Objective Area. PENGUIN has good target selectivity and ability to minimize the effects of land mass interference.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Conduct follow-on test and evaluation as required. Correct any deficiencies resulting from Operational Test and Evaluation. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated. The effects of fluctuating exchange rate between $ U.S. and Norwegian Kroner are not reflected.

(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 program decrease of $638 consisting of the following: FY 1981 a reduction of $175 results from the Navy application of the Congressional general reduction for escalation; FY 1982 a decrease of $216; FY 1983 a decrease of $213; and FY 1984 a reduction of $34 due to routine budget adjustments. It is assumed that a production decision will be issued by the last quarter of FY 1982. FY 1983 and FY 1984 funding will provide for correction of discrepancies found during Operational Evaluation and fund follow-on-test and evaluation as directed by Commander Operational Test and Evaluation Force.

Program Element: 64306N
Title: PENGUIN Combat System Development
DoD Mission Area: 232 - Amphibious, Strike, Antisurface 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	8,500	6,067	3,874	1,836	511	21,988
S1241	PENGUIN COMBAT SYSTEM DEVELOPMENT	8,500	6,067	3,874	1,836	511	21,988

(U) OTHER APPROPRIATION FUNDS: Not Applicable

Program Element: 64306N
Title: PENGUIN Combat System Development
DoD Mission Area: 232- Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The PENGUIN Missile MK-0 development program by the Royal Norwegian Navy with US Navy participation took place during the 1962-1970 time frame. The follow-on Norwegian developed MK 1 has been operationally employed by Norway since 1972. The PENGUIN missile system MK 2 is a further development by Norway and is currently in production. Chief of Naval Operations project 573-OT-II was initiated in February 1977 to evaluate the operational effectiveness and suitability of the PENGUIN System MK 2 in the Special Warfare Craft, Medium. Commander, Operational Test and Evaluation Force, operational evaluation (OT-II) was favorable and Phase III evaluation was recommended: however, Congressional action terminated the Special Warfare Craft, Medium program in August 1978. The PENGUIN Combat System Development was established as a FY 1980 new start to investigate and evaluate a more operationally effective and suitable weapons suite to satisfy a weapons deficiency identified by operational testing during MK 3 Patrol Boat evaluations. The PENGUIN Combat System consists of a PENGUIN Weapon Control System, PENGUIN Missiles (MK 2), Box Launchers, interface equipments, data, and services. The missile is a short range, inertially guided, passive infrared, terminal homing anti-shipping missile.

(U) RELATED ACTIVITIES: None

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ships Weapon Systems Engineering Station, Port Hueneme, CA; Naval Sea Systems Command Detachment, Norfolk, VA; Naval Research Laboratory, Washington, D.C.; Contractor: Royal Norwegian Navy Materiel Command, Bergen, Norway, Kongsberg Vapenfabrikk, Kongsberg, Norway: Norwegian Defense Research Establishment, Kjeller, Norway; EG&G (Washington Analytical Services Center, Inc.), Arlington, VA.; Value Systems Engineering, Arlington, VA.; Asset, Inc, Arlington, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The PENGUIN Combat System Development was established as an independent NATO initiative Program in FY 1979. A Memorandum of Understanding with Norway was signed in April 1979 and a contract was negotiated and signed in June 1979 with the Norwegian Naval Material Command to procure the necessary modified system hardware and support. Commenced joint testing of the countermeasures enhanced MK 2 Mod 4 Guidance Unit and continued participation with the Norweigan Navy national Penguin testing. Promulgated final version of program documentation including a Navy Decision Coordinating Paper and Test and Evaluation Master Plan. Completed Safety, Hazards of Electronic Radiation to Ordnance, Electromagnetic Vulnerability, Electromagnetic Compatibility, Electromagnetic Interference, Captive Seeker, and shipboard integration testing. Continued participation in the Norwegian Penguin Testing. Complete review of translated Norwegian Test Documentation.

2. (U) FY 1982 Program: Navy Decision Coordinating Paper approved, Test and Evaluation Master Plan will be approved. Complete high speed MK2 MOD3 and MK2 MOD4 Guidance Unit side-by-side Captive Tests. Conduct Technical Evaluation structural test firings and Operational Test and Evaluation at Cape Canaveral, Florida, obtain Approval for Service Use if evaluation so indicates. Make

procurement decision.

3. (U) FY 1983 Planned Program: Conduct follow-on test and evaluation as required by Commander Operational Test and Evaluation Force to evaluate final configuration of production hardware.

4. (U) FY 1984 Planned Program: Conduct follow-on test and evaluation as required by Commander Operational Test and Evaluation Force to evaluate final configuration of production hardware.

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

6. (U) Milestones: Not applicable.

7. (U) Resource: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64307N
Title: CG-47/AEGIS Product Improvement
DoD Mission Area: 231 - Anti-Air 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	40,000	23,802**	45,147	61,056	Continuing	Continuing
S1275	SPY-1 Radar Improvements	40,000*	18,862**	15,008	9,670	15,817	99,357
S1447	CG-47/AEGIS Product Improvements	0	4,940**	30,139	51,386	Continuing	Continuing

* FY 1981 Congressionally directed new start under Program Element 63589N, DDGX.
** FY 1982 funding in Program Element 64303N, AEGIS.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: TICONDEROGA, CG-47, will be commissioned in January 1983. She is the first of a 21 to 24 ship class which will not fully deploy until the 1990's. The AEGIS Combat System in CG-47 was developed under Program Element 64303N, AEGIS and Program Element 64304N, CSEDS, beginning in 1974. This Program Element continues the engineering necessary to upgrade that combat system so that later ships of the class will retain battle effectiveness against the escalating Soviet threat. It is intended to take advantage of maturing equipment and weapon systems being developed elsewhere in the Navy's budget. Project S1275 SPY-1 Radar Improvements will provide a light weight, lower cost and more capable version of the SPY-1 radar for later AEGIS ships. This upgrade is necessary in order to keep pace with the ever increasing threat. The upgraded radar will be designated SPY-1B. Project S1447 CG-47/AEGIS Product Improvements provides for the AEGIS Combat System engineering analysis, computer programming, interface design, technical documentation and testing required to integrate multi-mission warfare upgrades. These upgrades result from maturing systems whose development in most cases is funded under other programs. The purpose of such upgrades is to enhance reliability, reduce cost and weight, and significantly increasing performance to stay ahead of the threat.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S1275 SPY-1 Radar Improvements: Complete testing of signal processor power supply and analog/digital assemblies, and start testing of full-up signal processor cabinets. Complete fabrication of transmitter modifications and qualify a double duty cross-field amplifier tube. Complete assembly of low sidelobe antenna and start testing. Continue computer program coding. Project S1447 CG-47/AEGIS Product Improvement: Continue combat system engineering, integration, and test necessary to upgrade the CG-47 Anti-Submarine Warfare suite. Anti-Submarine Warfare upgrade efforts include integration of the Anti-Submarine Warfare Control System AN/SQQ-89 Underwater Sensor System, Tactical Towed Array Sonar, and an upgraded hull mounted SQS-53 sonar. Also continue to develop shock resistant solid state circuit breakers (also called power controllers) for use throughout the combat system. The significant increase between FY 1982 and FY 1983 ($25,199 thousand) is due

to new integration efforts starting in FY 1983. These efforts are related to TOMAHAWK and TOMAHAWK Common Weapon Control System integration, Electronic Warfare System, upgrade of the CG-47 communications suite, conversion to AN/UYQ-21 consoles in the CG-47 Combat Information Center, application of electrical power management techniques to the ship, and work on the Battle Group AAW Display Group and autogridlock development. As this is a continuing program, the above funding includes outyear escalation and encompasses all development phases now planned through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) There was no FY 1982 Program Element Descriptive Summary since Program Element 64307N was initiated for FY 1983. Previous funding was provided under Program Element 64303N, Area Air Defense, same project numbers. Project S1275 SPY-1 Radar Improvements: FY 1982, a decrease of 360 is the result of refined cost estimates including escalation. FY 1983, an increase of 4,861 resulting from the decision to combine Project S1449 Light Weight AEGIS under PE 63589 DDGX with this project, as they were both funding the development of the improved SPY-1 Radar. Project S1447 CG-47/AEGIS ProductG Improvement: FY 1982: A decrease of 118 due to minor cost refinements including escalation. FY 1983: An increase of 17,058 due to a change in scope of the program which will include the following not programmed in the prior year (1) integration of Vertical Launching System/TOMAHAWK, (2) Electronic Warfare System, (3) upgraded radio system and (4) integration of Battle Group Anti-Air Warfare Coordination Elements.

(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	40,000	24,280	23,228	Continuing	Continuing
S1275	AEGIS Product Improvements*	0	40,000	19,222	10,147	Continuing	Continuing
S1447	Combat System Improvements*	0	0	5,058	13,081	Continuing	Continuing

* FY 1982 project titles under PE 64303N, Area Air Defense (AEGIS).

(U) OTHER APPROPRIATION FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
SCN (CG-47)	1,911,900	2,997,400	3,134,400	3,340,600	Continuing	Continuing
Quantity	(2)	(3)	(3)	(3)		

Program Element: 64307N
DoD Mission Area: 231 - Anti-Air Warfare

Title: CG-47/AEGIS Product Improvement
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for the continued development of the CG-47 AEGIS Combat System including the SPY-1 radar throughout the decade in which the ships will be built. It is founded on the Combat System hereafter called Baseline I, accomplished under Program Element 64304N, CSEDS for TICONDEROGA, CG-47. Since the construction of the remaining ships will stretch into the 1990's there is a need to upgrade the Combat Systems for these ships to maintain battle effectiveness against an increasing threat. These upgrades result from maturing systems whose development, in most cases, is funded elsewhere in the Navy budget. At least two additional baseline upgrades are now necessary encompassing each of the Warfare Areas-Anti-Air, Anti-Submarine, and Surface Strike. Baseline II is organized around the introduction of Vertical Launch and the Vertically Launched TOMAHAWK. Baseline III is organized around the introduction of AN/SPY-1B. Other upgrades included in one or both of these baselines are a cruiser-configured radio suite, conversion of the Combat Information Center to UYQ-21 consoles, NTDS Link 11 Model 5, the Anti-Submarine Warfare Combat System, (Anti-Submarine Warfare Control System, AN/SQS-89 Underwater Sensor Syste, Tactical Towed Array Sonar System, and improved hull-mounted sonar), Battle Group Anti-Air Warfare Display Group, Autogridlock capability, and electrical power management techniques. Funds under this project will provide the system engineering, analysis, computer program modifications, interface design changes, technical documentation updates, and system testing necessary to assure these new systems function correctly and responsively in the AEGIS Combat System. Work will be performed at the Combat System Engineering Site, Moorestown, NJ.

(U) RELATED ACTIVITIES: Program Element 64304N, Combat System Engineering Development; Program Element 64303N AEGIS.

(U) WORK PERFORMED BY: In House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA. Contractors: RCA, Moorestown, NJ; Applied Physics Laboratory - Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 Prior Accomplishments: Project S1275 SPY-1 Radar Improvements. Completed technology studies. Began Full Scale Engineering Development to upgrade the SPY-1 radar transmitter, signal processor and low sidelobe antenna. Large scale integration and testing of a prototype microprocessor was completed. Transmitter modifications were started. Commenced computer program modifications.

2. (U) FY 1982 Program: Project S1275 SPY-1 Radar Improvements: Fabricate a double-duty cross-field amplifier tube for the transmitter. Continue design and fabrication of transmitter modification kits. Continue testing signal processor components including the power supply and the analog and digital assembly. Begin testing antenna model and complete phase shifter/driver pilot production. Project S1447 CG-47/AEGIS Product Improvements: Complete assessment of the application of Electrical Power Management to the Combat System. Conduct sample lot tests of low-current power controllers and begin development of high-current power controllers. Begin integration engineering of new Anti-Submarine Warfare systems.

Program Element: 64307N
DoD Mission Area: 231 - Anti-Air Warfare

Title: CG-47/AEGIS Product Improvement
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Project S1275 SPY-1 Radar Improvements: Complete testing signal processor power supply and analog/digital assemblies. Complete engineering and fabrication of transmitter modifications and qualify the new crossed-field amplifier tube. Complete assembly of the low sidelobe antenna prototype. Complete computer program coding and testing. Project S1447 CG-47/AEGIS Product Improvement: Complete testing of low-current power controllers and conduct testing of high-current power controllers. Continue AEGIS Combat System computer program development for new Anti-Submarine Warfare elements. Start engineering for conversion of Radar System and Combat Direction System to AN/UYQ-21 display consoles. Start TOMAHAWK integration. Complete preliminary design to upgrade communication system to cruiser configuration. Continue work on the Battle Group Anti-Air Warfare Display Group and Autogridlock (previously begun under PE 64303 Area Air Defense, Project Battle Group AAW Coordination (BGAAWC).

4. (U) FY 1984 Planned Program: Project S1275 SPY-1 Radar Improvements: Install Engineering Development Model at the Combat System Engineering Development Site. Begin systems testing. Project S1447 CG-47/AEGIS Product Improvement: Complete TOMAHAWK integration with AEGIS. Complete Anti-Submarine Warfare upgrade computer program development and UYQ-21 console conversion. Deliver radio system test units to the satellite engineering site at Naval Electronics System Engineering Activity. Start production of low and high current Solid State Power Controllers for Electrical Power Management. Start Link 11 Model 5 Combat System Engineering.

5. (U) Program to Completion: Project S1275 SPY-1 Radar Improvements: Complete SPY-1B radar systems testing. Obtain Approval for Service Use. Project S1447 CG-47/AEGIS Product Improvements: Complete test and evaluation of Solid State Power Controllers. Complete conversion of the Combat Information Center to AN/UYQ-21 display consoles. Complete AEGIS Combat System integration, test and evaluation for new Anti-Submarine Warfare elements including AN/SQQ-89 Underwater Sensor System, AN/SQR-19 Tactical Towed Array Sonar System, AN/SQS-53 Inproved hull mounted sonar, and MK-116 Model 6 Anti-Submarine Warfare Control System. Complete integration of Link 11 Model 5, and the upgraded communication system. Continue updates to the Battle Group Anti-Air Warfare Display Group. Complete Autogridlock development. Continue to integrate improved systems as appropriate to keep the CG-47 Class apace with the threat.

6. (U) Milestones: Not applicable.

Project: S1275
Program Element: 64307N
DoD Mission Area: 231 - Anti-Air Warfare

Title: SPY-1 Radar Improvements
Title: CG-47/AEGIS Product Improvements
Budget Activity: 4 - Tactical Warfare

(U) DETAILED BACKGROUND AND DESCRIPTION: In 1975 the Deputy Secretary of Defense directed the Navy to identify options for keeping the CG-47 Class from becoming obsolete during the ship construction period which will extend into the 1990's. One of the options identified at that time was to product improve three components of the AN/SPY-1A Radar -- the signal processor, transmitter, and array. These Product upgrades had as their aim reducing cost and weight, enhancing performance, increasing reliability, simplification and enhanced producibility while maintaining radar system form and fit. Specifically, these product upgrades involve: (1) Signal Processor: Technology advancements in three areas are being applied. First, microstrip techniques are used in intermediate frequency modules to increase packing density, reduce costs and increase reliability. Second, new integrated circuit devices, both Very Large Scale Integration and Large Scale Integration, are used to increase processing speed and allow incorporation of new functions dictated by an advancing Soviet threat. Third, microprocessors are used to simplify input/output control, permitting the use of more efficient built-in test equipment and providing future upgrade capability. (2) Transmitter: Two technology advances are applied to achieve higher duty cycle operation and increased reliability. The higher duty is achieved by incorporating an upgraded Crossed Field Amplifier tube with a modified slow-wave structure. Additionally, a more rugged switch tube for the modulator has been designed with higher reliability. The upgrade Transmitter uses the same basic configuration as the present design. The improvements can be retrofitted to extend the reliability and life cost savings to earlier ships of the class. (3) Array: Increased radar performance in heavy electronic countermeasures is made possible through dramatic reduction of antenna peak and average sidelob levels. Low sidelobe performance is achieved through better array tolerance controls and refined phase granularity. Numerical controlled machining provides the precision requied for tolerance control and to reduce errors. Use of distributed microprocessors results in significant weight and cost reductions, while increasing reliability. In FY 1981, Congress appropriated $40 million for an early start to this program under Program Element 63589N Major Surface Combatant Development (Advanced) in order to preserve the option of upgrading an FY 1983 ship. In FY 1982 funds for the work shifted to Program Element 64303N and in FY 1983 to this Program Element.

(U) RELATED ACTIVITIES: Program Element 64304N, Combat System Engineering Development, Program Element 63536N, Stand-Off Jammer Suppression; Program Element 63589N, Major Surface Combatant Development Project, Project No. S1449, Light Weight AEGIS and Project No. S1558, AEGIS Product Improvements (Advanced).

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA. Contractors: RCA, Moorestown, NJ, Applied Physics Laboratory-Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Extensive study and key experiments of manufacturing capability, radar operation and other technological advances were started within Project S0165 AEGIS, in order to prove concept and feasibility for providing substantiual improvements to the SPY-1A Radar System. In FY 1981, full scale development work began under Program Element 63589N

Project: S1275
Program Element: 64307N
DoD Mission Area: 231 - Anti-Air Warfare

Title: SPY-1 Radar Improvements
Title: CG-47/AEGIS Product Improvements
Budget Activity: 4 - Tactical Warfare

Major Surface Combatant Development, Project S1558 AEGIS Product Improvement (Advanced) to upgrade the SPY-1A transmitter, low sidelobe antenna and signal processor. As a result of a $40 million Congressional add-on, fabrication and testing of Signal Processor and low sidelobe array components was initiated. Large Scale Integration and testing of prototype microprocessor was completed. Design of transmitter modifications also began. Modifications to AN/SPY-1A and combat direction system computer programs were initiated.

2. (U) FY 1982 Program: (Funded under Program Element 64303N Area Air Defense Proj. S1275 and Program Element 63589N, Proj. S1449). Continue testing signal processor components, in particular the power supply assembly and the analog and digital assembly. Fabricate a double duty Crossed Field Amplifier tube for the transmitter. Continue design and fabrication of transmitter modification kits. Start testing antenna model and complete phase shifter/driver pilot production. Continue computer program coding and testing.

3. (U) FY 1983 Planned Program: Complete testing the Signal Processor power supply and analog/digital assemblies. Start integrating and testing full-up Signal Processor Cabinets. Complete engineering and fabrication of transmitter modifications and qualify the double duty Crossed Field Amplifier tube. Complete assembly of low sidelobe antenna prototype. Complete computer program coding and continue testing.

4. (U) FY 1984 Planned Program: Start installation of Engineering Development Model 4 at the Combat System Engineering Development Site and start system tests.

5. (U) Program to Completion: Complete engineering development, testing and integration of Radar System upgrades. Commit to Service Use.

6. (U) Milestones:

Milestones	Date
1. Component Testing (DT/OT-IIA)	FY 1983
2. Milestone IIIA, Limited Production Decision	1983
3. System Testing (DT/OT-IIB)	FY 1984
4. Milestone IIIB, Approval for Service Use	1984

Project: S1275
Program Element: 64307N
DoD Mission Area: 231 - Anti-Air Warfare

Title: SPY-1 Radar Improvements
Title: CG-47/AEGIS Product Improvements
Budget Activity: 4 - Tactical Warfare

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S1275	SPY-1 Radar Improvements	40,000*	18,862	15,008	9,670	15,817	99,357

* Congress appropriated $40.0 million for FY 1981 start under Program Element 63589N Major Surface Combatant Development, Project S1558 AEGIS Product Improvement (Advanced).

Project: S1447 Title: CG-47/AEGIS Product Improvements
Program Element: 64307N Title: CG-47/AEGIS Product Improvement
DoD Mission Area: 231 - Anti-Air Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for the continued development of the CG-47 AEGIS Combat System throughout the decade in which the ships will be built. It is founded on the Combat System hereafter called Baseline I, accomplished under Program Element 64304N, CSEDS for TICONDEROGA, CG-47. Since the construction of the remaining ships will stretch into the 1990's there is a need to upgrade the Combat Systems for these ships to maintain battle effectiveness against an increasing threat. These upgrades result from maturing systems whose development, in most cases, is funded elsewhere in the Navy budget. At least two additional baseline upgrades are now necessary encompassing each of the Warfare Areas-Anti-Air, Anti-Submarine, and Surface Strike. Baseline II is organized around the introduction of Vertical Launch and the Vertically Launched TOMAHAWK. Baseline II' is organized around the introduction of AN/SPY-1B. Other upgrades included in one or both of these baselines are a cruiser-configured radio suite, conversion of the Combat Information Center to UYQ-21 consoles, NTDS Link 11 Model 5, the Anti-Submarine Warfare Combat System, (Anti-Submarine Warfare Control System, AN/SQQ-89 Underwater Sensor System, Tactical Towed Array Sonar System, and improved hull-mounted sonar), Battle Group Anti-Air Warfare Display Group, Autogridlock capability, and electrical power management techniques. Funds under this project will provide the system engineering, analysis, computer program modifications, interface design changes, technical documentation updates, and system testing necessary to assure these new systems function correctly and responsively in the AEGIS Combat System. Work will be performed at the Combat System Engineering Site, Moorestown, NJ.

(U) RELATED ACTIVITIES: Program Element 64304N, Combat System Engineering Development; Program Element 64303N AEGIS.

(U) WORK PERFORMED BY: In House: Naval Surface Weapons Center, Dahlgren, VA; Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA. Contractors: RCA, Moorestown, NJ; Applied Physics Laboratory - Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 Prior Accomplishments: Not applicable.

2. (U) FY 1982 Program: Complete assessent of the application of Electrical Power Manageent to the Combat System. Conduct sample lot tests of low-current power controllers and begin development of high-current power controllers. Begin integration engineering of new Anti-Submarine Warfare systems.

3. (U) FY 1983 Planned Program: Complete testing of low-current power controllers and conduct testing of high-current power controllers. Continue AEGIS Combat System computer program development for new Anti-Submarine Warfare elements. Start engineering for conversion of Radar System and Combat Direction System to AN/UYQ-21 display consoles. Start TOMAHAWK integration. Complete preliminary design to upgrade communication system to cruiser configuration. Continue work on the Battle Group Anti-Air

Project. S1447 — Title: CG-47/AEGIS Product Improvements
Program Element: 64307N — Title: CG-47/AEGIS Product Improvement
DoD Mission Area: 231 - Anti-Air Warfare — Budget Activity: 4 - Tactical Programs

Warfare Display Group and Autogridlock (previously begun under PE 64303 Area Air Defense, Project S0324 Battle Group AAW Coordination (BGAAWC).

4. (U) FY 1984 Planned Program: Complete TOMAHAWK integration with AEGIS. Complete Anti-Submarine Warfare upgrade computer program development and UYQ-21 console conversion. Deliver radio system test units to the satellite engineering site at Naval Electronics System Engineering Activity. Start production of low and high current Solid State Power Controllers for Electrical Power Management. Start Link 11 Model 5 Combat System Engineering.

5. (U) Program to Completion: Complete test and evaluation of Solid State Power Controllers. Complete conversion of the Combat Information Center to AN/UYQ-21 display consoles. Complete AEGIS Combat System integration, test and evaluation for new Anti-Submarine Warfare elements including AN/SQQ-89 Underwater Sensor System, AN/SQR-19 Tactical Towed Array Sonar System, AN/SQS-53 Improved hull mounted sonar, and MK-116 Model 6 Anti-Submarine Warfare Control System. Complete integration of Link 11 Model 5, and the upgraded communication system. Continue updates to the Battle Group Anti-Air Warfare Display Group. Complete Autogridlock development. Continue to integrate improved systems as appropriate to keep the CG-47 Class apace with the threat.

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
S1447	CG-47/AEGIS Product Improvements	0	4,940	30,139	51,386	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64314N
DoD Misson Area: 221 - Counter Air

Title: Advanced Medium Range Air - to - Air 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	22,509*	4,994	4,714	6,916	82,000	172,893
W0981	Advanced Medium Range Air-to-Air Missile	22,509*	4,994	4,714	6,916	82,000	172,893
	Quantity (Operational Evaluation)						(70)

*Funded under Program Element 63370N, Beyond Visual Range Air-To-Air Missile.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This joint Navy/Air Force program is structured in response to the Joint Service Operational Requirement and Mission Element Need Statement, to develop an air superiority air-to-air missile with significant improvements in operational utility and combat effectiveness as a SPARROW follow-on missile. The need described is an all weather, all aspect, beyond visual range air-to-air missile compatible with the F-14, F-15, F-16 and F/A-18 aircraft, and with a performance envelope significantly improved over the AIM-7F/M SPARROW, increased missile velocity, This program is jointly funded. The Air Force Counter Air analysis indicates the crucial need for an Advanced Medium Range Air-to-Air Missile to counter the projected threat in 1986 and beyond. This threat includes

(U) BASIS FOR FY 1983 REQUEST: The Full Scale Development phase of the Advanced Medium Range Air-to-Air Missile commences in FY 1982 and is funded by the Air Force. Navy funds will assure that all unique applications and analyses of tradeoffs, including surface-to-air and shipboard applications will be investigated. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT 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 4,714 in FY 1983 and the 82,000 in "Additional to Completion" are to fund Navy unique applications and initial operational test and evaluation (Operational Evaluation) of the missile. Seventy missiles will be procured and utilized during Navy's Operational Evaluation. Air Force program element 64314F provides funding for full-scale development of this joint program. The minor decrease in FY 1982 (-6) results from refinement of cost estimates including inflation.

Program Element: 64314N
DoD Misson Area: 221 - Counter Air

Title: Advanced Medium Range Air - to - Air Missile
Budget Activity: 4 - Tactical Programs

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

Project No.	Title	FY 198' Actual	FY 198[illegible] Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	5,000	TBD	TBD	TBD
W0981	Advanced Medium Range Air-to-Air Missile	0	0	5,000	TBD	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

- corrected 2/9/82

Program Element: 64314N
DoD Mission Area: 221 - Counter Air

Title: Advanced Medium Range Air - to - Air Missile
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This joint Navy/Air Force program has the overall objective of continued improvement in United States air-to-air combat effectiveness. The Joint Air-to-Air Missile Requirements Study was initiated by the Under Secretary of Defense for Research and Engineering in October 1975. Combat deficiencies identified in Southeast Asia and the resultant improvements incorporated in the AIM-7F SPARROW were reviewed to form the baseline for near and far term requirements definition. The study group reviewed the current and projected airborne threat spectrum, the Air Force/Navy roles and their relative priorities, and current technologies. A Joint Service Operational Requirement was developed, validated in September 1978, which, with the Mision Element Need Statement, approved by the Secretary of Defense in January 1979, provides the basis for the Advanced Medium Range Air-to-Air Missile development effort. The threat spectrum for which the Advanced Medium Range Air-to-Air Missile is optimized includes: manned aircraft (fighters, bombers, fighter-bombers and interceptors)[redacted] The projected aircraft threat includes: [redacted] and air-to-air missiles. The development effort has the objectives of significantly increasing U.S. air-to-air capability and operational utility in the 1980s and beyond by producing a more effective, reliable, affordable, and maintainable missile, with emphasis on low altitude targets in an Electronic Countermeasures environment. The proposed Advanced Medium Range Air-to-Air Missile designs utilize inertial mid-course and an active radar terminal guidance approach. Key features which will improve operational utility include: [redacted] Mature technologies, such as solid state electronics, high rate digital computers, and terminal guidance-aided fuzing, are featured in the contractor approaches. Of prime importance is the requirement for the missile to be totally compatible with the fire/weapons control systems of the F-14, F-15, F-16, and F/A-18 aircraft. The prototype advanced development effort began in 1979 with the selection of two competitive contractors to fabricate and test components and then fabricate total prototype systems for live missile firings (10 each per contractor). Rail launchers will be developed to provide the necessary aircraft/missile interfaces and will be capable of Advanced Medium Range Air-to-Air Missile and Sidewinder carriage. Ejection launchers will be modified SPARROW launchers or launchers developed for the Advanced Medium Range Air-to-Air Missile so as to maintain SPARROW launch capability.

(U) RELATED ACTIVITIES: The development program is a joint service effort with the Air Force as executive service. The Navy is assigned a Deputy Program Manager, a Deputy Chief Engineer, and deputies for Management, Test, Logistics, and Budget. Close relationship with the F-14, F-15, F-16, and F/A-18 program offices is maintained. Other programs which are related to full employment capability included: target identification and improved aircraft radar counter-countermeasures, and aircraft multiple target track and missile guidance. Air Force Program Element 64314F provides funding for full-scale development of this joint program.

Program Element: 64314N
DoD Mission Area: 221 - Counter Air

Title: Advanced Medium Range Air - to - Air Missile
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: Armament Division, Advanced Medium Range Air-to-Surface Missile Joint System Project Office, Eglin Air Force Base, FL; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Naval Air Station, Point Mugu, CA; U.S. Army Missile Research and Development Command, Redstone Arsenal, AL. Hughes Aircraft Company, Canoga Park, CA, was selected as the lead contractor for the Full Scale Development phase.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: During the first quarter of FY 1977, the Advanced Medium Range Air-to-Air Missile design definition was initiated based upon the Joint Service Operational Requirement as directed by the Under Secretary of Defense for Research and Engineering with funding provided by Congress. Design efforts included performance optimization and cost trade-offs, and the beginning of laboratory testing and scintillation/miss distance reduction demonstrations at the White Sands Missile Range Test Facilities. Design proposals were prepared in anticipation of the prototype phase in FY 1978. Although funding in the FY 1978 request was deleted, strong support from the services and the Department of Defense resulted in discussions and formal communications between the Department of Defense and Congress. A reprogramming request of $7.0 million from the Air Force and $6.0 million from the Navy was approved by Congress on 26 July 1978. The effort in this fiscal period included component development and evaluation; system performance cost/effectiveness evaluations; aircraft fire control/radar interface investigations; evaluation of Electronic Countermeasures and clustered target capability, and continued analysis of surface-to-air and long range applications. Initiation of the Validation Phase (Prototype) was approved at Milestone I in November 1978. Transition of the program into the validation prototype phase of advanced development occurred with contracts awarded in February 1979. Prototype hardware subsystems were fabricated and subjected to extensive environmental and laboratory testing. Development of physical and electronic interfaces for the F-14, F-15, F-16, and F/A-18 were initiated. Total missile system build-up and testing was initiated. Captive carriage, reliability testing, and the integration and evaluation of total system function validation initiated. Propulsion concepts were tested and Preliminary Flight Rating Tests completed. Rail and ejection launched development and modification have been initiated. In FY 1980, development continued with the initiation of competitive live missile firing demonstrations of 10 missiles each by two contractors. This effort demonstrates the design/performance objectives of the basic missile as set forth in the Joint Service Operational Requirement goals and the Mission Element Need Statement. Fabrication of the separation test and control test vehicles were completed; missile hardware for semi-physical simulations was delivered. The guided test vehicles, rail and ejection launchers were delivered during this period so that the Class II modificatons to the F-14, F-15 and F-16 could be completed. Seeker captive carriage testing continued. Flight testing of separation and control test missiles were initiated in time for the start of the guided test flight series. Preliminary aircraft interface documentation was also completed. During FY 1981 the competitive prototype flight tests concluded with live missile firings for F-15 and F-16 aircraft. Test data from all areas of evaluation were compiled, reduced, and analyzed. The Air Force initiated detailed Operational Utility Evaluation simulations to address the effect of tactics, missile kinematics and missile guidance capabilities in defeating the threat. The results will be formalized in support of presentations leading to a Milestone II decison.

Program Element: 64314N
DoD Mission Area: 221 - Counter Air

Title: Advanced Medium Range Air - to - Air Missile
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Planned Program: Competitive prototype flight tests will be completed. Initiation of the full scale development phase began in FY 1982 with Milestone II planned for September 1982. The Advanced Medium Range Air-to-Air Missile program began full scale development with the Hughes Aircraft Company in December 1982. Fabrication of pilot and preproduction hardware and extensive Development/Initial Operational/Operational Test and Evaluation are planned. Navy will continue to analyze all unique applications incuding surface-to-air and shipboard applications.

3. (U) FY 1983 Planned Program: Continue analysis of all unique applications and conduct limited evaluation of utility leading to operational evaluation and approval for service use.

4. (U) FY 1984 Planned Program: Initiate procurement of launchers to support Navy unique Operational Evaluation. Continue analysis of all unique applications and conduct limited evaluation of utility.

5. (U) Program to Completion: Continue Full Scale Development Phase with completion anticipated FY 1985. Continue intensive developmental refinement of missile components and analysis of trade-offs, including surface-to-air applications. Development Test and Evaluaton/Initial Operational Test and Evaluation are to be completed.

6. (U) Milestones:

Milestones		Date
a. Start Design Definition		October 1976
b. Complete Design Definition		May 1977
c. Start Preprototype Evaluation		July 1978
d. Complete Preprototype Evaluations		September 1978
e. Milestone/DSARC I		November 1978
f. Award Advance Development Contracts		February 1979
g. Subsystem Test Start		March 1979
h. Flight Tests Start (Government Test Vehicles)		September 1980
i. Subsystem Test End		September 1981
j. Flight Test Ends	(September 1981)*	November 1981
k. Milestone/DSARC II	(November 1981)*	September 1982
l. Start Full Scale Development		November 1981
m. Complete Full Scale Development	(February 1985)*	February 1986
m. Producton Go Ahead		March 1985
o. Operational Evaluation of F-14 and F/A-18	(June 1985)*	July 1985
p. Complete Operational Evaluation (F-16 and F-15)		October 1986

P.ogram Element: 64314N
DoD Mission Area: 221 - Counter Air

Title: Advanced Medium Range Air - to - Air Missile
Budget Activity: 4 - Tactical Programs

* Milestone dates shown in the FY 1982 Descriptive Summary.

Item k reflects a change in Milestone/DSARC II planned date based on DoD revised initiatives.

Item m reflects restructure of full-scale development phase to include mature hardware and more precise program test and evaluation defintions.

Program Element: 64314N
DoD Mission Area: 221 - Counter Air

Title: Advanced Medium Range Air-to-Air Missile
Budget Activity: 4 - Tactical Programs

TEST & EVALUATION:

1. (U) Development Test & Evaluation: During the validation phase 20 free flight missile will be launched; these consist of separation, control and guided test vehicles. To date, eight test vehicles have been launched. The separation test and control test are complete and the guided vehicle tests have started with one contact hit and one eight-foot miss. Fourteen guided test vechiles will be launched in free flight to demonstrate/ compatibility with the F-14, F-15, and F-16 aircraft, reliability and performance goals. Included in the missile firing program will be a demonstration of the Advanced Medium Range Air-to-Airr Missile's[ ] Each of the competing prime contactors - Hughes Aircraft Company and Raytheon Company - have developed their own missile design and will provide ten guided test vehicles. The guided test vehicles were scheduled to be fired during FY 1981 and FY 1982 but not all firings have been completed to date. These missiles will mature in design from early checkout vehicles to all up system teets, including aircraft avionics and complete prototype missiles. The validation captive carry program consists of two test efforts, an aircraft integration/environment effort and an Advanced Medium Range Air-to-Air Missile seeker test unit effort. The following hours have been flown for integration/environmental studies; F-15, 19 hours, F-16, 16 hours, and F-14, 6 hours. Six additional hours are planned for the F-14. Form and fit tests have been accomplished on the F-18. A total of 53 captive carry hours have been flown with seeker test units covering acquisition, tracking and relaunch studies. The full-scale development plan calls for 87 missile firings to accomplish combined test and evaluation of the F-16 and development test and evaluation of the F-14, F-15, and F/A-18 aircraft. Four of these missiles will have warheads. A captive carry program will be conducted similar to that accomplished during validation phase. In addition, 17 missiles will be produced for reliability and six missiles for each aircraft for the tactical aircraft modification program.

OPERATIONAL TEST & EVALUATION:

2. (U) Combined development test and evaluation/initial operational test and evaluation is planned during the validation and full-scale development phases. During the validation phase, operational test and evaluation will consist of monitoring development test and evaluation events. The weapons that will be tested will be functionally, but not completely mechanically similar to production items. During full-scale development, combined test and evaluation will be conducted on the F-16 with 40 live firings and 10 guided test vehicles for use in a captive carry reliability demonstration program. During full-scale development, initial operational test and evaluation will be combined with developmental test and evaluation, when the Advanced Medium Range Air-to-Air Missile configuration is representative of production missiles. In addition, a separate phase of initial operational test and evaluation will be conducted for the F-14, F-15, and F/A-18 at the end of full-scale development. Data collected during both the combined and separate phases of initial operatonal effectiveness and suitability will be used to support the production milestone. Full-scale development testing will be conducted from FY 1983 thru early FY 1986. Operational test and evaluation (OT&E) in the FY 1985-1986 time frame. The Air Force Test and Evaluation Center will have the overall management responsibility for Advanced

Program Element: 64314N
DoD Mission Area: 221 - Counter Air

Title: Advanced Medium Range Air-to-Air Missile
Budget Activity: 4 - Tactical Programs

Medium Range Air-to-Air Missile operational test and evaluation plan. Specific test locations have been determined for each service. The White Sands Missile Range, NM, and the Eglin Gulf Test Range, FL will be used to support Air Force missions. The Pacific Missile Test Center, CA and the Naval Weapons Center, China Lake, CA will be used to support Navy missions. Preliminary Advanced Medium Range Air-to-Air Missile initial Operational Test and Evaluation planning has been accomplished. U.S. Air Force and Navy personnel will operate the Advanced Medium Range Air-to-Air Missile throughout the development program. Contractor personnel will maintain the Advanced Medium Range Air-to-Air Missile during validation and demonstration and the beginning of full-scale engineering development. Thereafter, all equipment will be maintained by Air Force and Navy personnel.

SYSTEMS CHARACTERISTICS:

3. (U) The missile system is being defined in response to the Mission Element Need Statement (MENS) and the Joint Service Operational Requirement document. The objectives data listed below are tentative and reflect Joint Service Operational Requuirement specifics, which will continue to be subjected to cost/performance trade-offs.

Speed
- Maximum Mach [redacted]
- Launch compatible with launch aircraft.

Altitude
- Maximum - [redacted]
- Minimum - [redacted]

Range
- Maximum nautical miles - [redacted]
- Minimum, feet - [redacted]

Accuracy, circular error probable - [redacted]

Reliability
- Mean flight hours between failure - 450-600
- Free flight - .8-.85

Missile Description:
- Launch weight (lb) - 275-325
- Warhead weight (lb) - 40-50
- Guidance type

[redacted]

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64352N
Title: Surface-Launched Weaponry Ship Systems
DoD Mission Area: 231 - Anti-Air 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	38,352	42,505	3,413	3,372	Continuing	Continuing
S0170	SAM Anti-Missile Capability	3,068	2,935	1,916	1,930	Continuing	Continuing
S0171	Ultra-High Frequency Telemetry	1,135	1,320	1,497	1,442	Continuing	Continuing
S0188	New Threat Upgrade	25,282	23,521	**	**	Continuing	Continuing
S0964	TARTAR CGN New Threat Upgrade	8,867	14,729	**	**	Continuing	Continuing

** S0188 and S0964 funded under element 64372N: New Threat Upgrade FY 1983 and beyond.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports development of shipboard missile systems to counter continuing major and projected anti-ship missile threats. It encompasses improvements to both the tactical TERRIER and TARTAR systems found on our guided missile cruisers and destroyers and associated telemetering equipment used for weapon system readiness assessments.

(U) BASIS FOR FY 1983 RDT&E REQUEST: SAM Anti-Missile Capability: Continue TERRIER and TARTAR reliability, maintainability and availability improvements like SPG-51D solid state logic and solid state power supply. Start development of improvements to counter the increasing threat. Ultra High Frequency Telemetry: Develop equipments in support of surface-to-air missile firing assessment. 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 PROGRAM ELEMENT 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, a net increase of 7,690 approved Congressional DD1415 reprogramming into Project S0188 New Threat Upgrade due to increased program costs. Additionally, 715 increase in project S0964 TARTAR CGN/New Threat Upgrade by partial transfer of OPN funds associated with special purpose computer software development and documentations, and an increase of 193 in Project S0170 SAM Anti-Missile Capability and a decrease of 100 in S0171 UHF Telemetry due to routine funding adjustments. In FY 1982, a total net decrease of 14,881 resulting from adjustments for inflation of -80 in Project S0170 SAM Anti-Missile Capability, -35 in Project S0171 Ultra High Frequency Telemetry, -26 in Project S0188 New Threat Upgrade, and -18 in Project S0964 TARTAR CGN/New Threat Upgrade. Additionally, 3,000

Program Element: 64352N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Surface-Launched Weaponry Ship Systems
Budget Activity: 4 - Tactical Programs

was added to Project S0188 New Threat, by Congress ,and Project S0179 MK-92 FCS upgrade was transferred to new Program Element 64301N (-17,722).

(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	31,622	29,854	57,386	TBD	Continuing	Continuing
S0170	SAM Anti-Missile Capability	5,088	2,875	3,015	TBD	Continuing	Continuing
S0171	Ultra-High Frequency Telemetry	1,024	1,235	1,355	TBD	Continuing	Continuing
S0179	MK-92 FCS Upgrade	*	*	17,722	TBD	Continuing	Continuing
S0188	New Threat Upgrade	17,214	17,592	20,547	TBD	Continuing	Continuing
S0964	TARTAR CGN/New Threat Upgrade	8,296	8,152	14,747	TBD	Continuing	Continuing

* S0179 Funded in element 64652N: Gun System Improvement Program prior 1982.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN (TERRIER CG/SM-2)	51,866	34,627	41,346	44,171	Continuing	Continuing
OPN (TARTAR DDG Upgrade)	9,294	56,600	37,500			
OPN (TARTAR CGN/SM-2 Upgrade)	7,226	21,730	25,063	25,305	Continuing	Continuing

Program Element: 64352N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Surface Launched Weaponry, Ship Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for major improvements to existing TERRIER and TARTAR surface missile systems to eliminate weaknesses in system effectiveness to counter Anti-Ship Missile threats. Studies and development will include optimum design of systems capable of defeating the projected threat and capable of technology growth in the outyears to keep pace with threat projections. This includes both tactical systems and active evaluation systems utilizing telemetered missiles. Project S0170 SAM Anti Missile Capability provides Electronic Counter-Countermeasure improvements like monopulse for MK 74 FCS and improving the reliability, maintainability and availability of TARTAR and TERRIER weapon systems. Project S0188 New Threat Upgrade provides even greater improvements to the baseline CG/SM-2 System to engage the most severe threats by adding more improvements to the search radars, automatic target detection and track, and integration with the STANDARD Missile-2 Block-II. Project S0964 TARTAR CGN New Threat Upgrade will provide New Threat Upgrade type capabilities to the 10 CGN/DDG-993 TARTAR ships. Project S0171 Ultra High Frequency Telemetry is a relatively low level of effort providing continuing improvements to the STANDARD Missile telemetering capability for STANDARD Missile-2 midcourse guided missiles.

(U) RELATED ACTIVITIES: Standard Missile Improvements, PE 64366N, Surface Missile Warhead Development, PE 64365N, Radar Surveillance Equipment (Engineering), PE 64508N; New Threat Upgrade, PE 64372N.

(U) WORK PERFORMED BY: In-House: Naval Avionics Facility, Indianapolis, IN; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Naval Surface Weapon Center, Dahlgren, VA; Naval Ship Weapon Systems Engineering Station, Pt. Hueneme, CA. Contractors: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD, Automation Industries, Inc., Vitro Laboratories, Silver Spring, MD; Raytheon, Wayland, MA; Sperry Rand, Great Neck, NY; General Dynamics, Pomona, CA; Northern Ordnance Corp., Minneapolis, MN; Electronics Communications Inc., St. Peterburg, FL; UNIVAC, Minneapolis, MN; ITT Gilfillan, Van Nuys, CA., Sperry Gyroscope Division of Sperry Rand Corporation, Great Neck, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0170 SAM Anti Missile Capability: Digital Fire Control developed for TARTAR, TERRIER systems. Junior Participating Tactical Data System modifications developed for TARTAR. Developed the TERRIER, Guided Missile Cruiser/Standard Missile-2 (CG/SM-2) hardware and computer programs to provide increased system effectiveness of the TERRIER System by exploiting the inherent characteristics of the STANDARD Missile-2. Completed Operational Evaluation of the TERRIER CG/SM-2 Combat System and obtained Approval for Service Use in October 1979. Completed design to implement the new Radar Data Processor and Digital Weapon Direction System for TARTAR. Completed development of pulse solid state power supply, solid state logic and monopulse for SPG-51D transmitter in CGN/SM-2 baseline. Completed engageability equations for STANDARD Missile-1 Block VI missiles for CGN-38 Class. Completed CWI Transmitter modificatons design. Completed DDG Class Upgrade. Project S0171 Ultra High Frequency Telemetry: Continued development of a telemetry system for evaluation of STANDARD Missile-2 Block I missile fleet firings and began studies of Block II telemetry interface requirements. Initiate design/development of Pulse Code Modulation telemeter for STANDARD Missile-2 Block II and STANDARD Missile-2(N). Completed design of new portable shipboard

telemetry receiving stations to be compatible with the Pulse Code Modulation telemeter (including application to the RIM-7M SEASPARROW Missile). Project S0188 New Threat Upgrade: Completed specific design tasks that defined required improvements to search radars for detecting targets in severe electronic jamming[redacted] Completed detailed equipment and computer program design and commenced coding/debugging and testing of computer programs. Completed fabrication and commenced factory tests of all subsystem modifications. Commence installation of modification kits at land based test site. Initiated combat systems integration. Project S0964 TARTAR CGN New Threat Upgrade: A new start in FY 1979, developed the system requirements and specifications for the CGN TARTAR STANDARD Missile-2 baseline. Completed interface design specifications. Continued development of software design specifications. Acquisition plan completed and approved. Test and Evaluation Master Plan drafted. Completed design of TARTAR CGN STANDARD Missile-2, Block I, capability for CGN-38 Class. Continued design of computer programs for TARTAR CGN STANDARD Missile-2, Block I, capability for CGN-38 Class.

2. (U) FY 1982 Planned Program: Project S0170 SAM Anti Missile Capability: Continue TARTAR/TERRIER reliability and Electronic Counter-Countermeasures improvements. Project S0171 Ultra High Frequency Telemetry: Complete shipboard telemeter station procurement and update as required. Continue Pulse Code Modulation telemeter procurement. Project S0188 New Threat Upgrade: Complete land based test site evaluation. Complete installation of sub-system modification and computer programs in test ship (USS MAHAN). Conduct at sea Technical and Operational Evaluation. Obtain Approval for Service Use. Project S0964 TARTAR CGN New Threat Upgrade: Begin computer program testing. Prepare land based test site for Weapon Direction System software certification.

3. (U) FY 1983 Planned Program: Project S0170 SAM Anti Missile Capability: Continue Reliability and Maintainability Improvements and Electronic Counter Countermeasures improvements. Project S0171 Ultra High Frequency Telemetry: Continue development of required telemeter equipments.

4. (U) FY 1984 Planned Program: Project S0170 SAM Anti-Missile Capability: Continue Reliability and maintainability Electronic Counter Countermeasures improvements. Project S0171 Ultra High Frequency Telemetry. Continue improvements as needed.

5. (U) Program to Completion: Complete TARTAR Electronic Counter Countermeasures modifications. Complete addition of multi-track capability. Continue effort as necessary to update the weapon system to meet the changing threats, requirements for reduced manning and improved reliability and maintainability.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64353N
Title: Vertical Launching 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	67,672	70,424	33,878	26,832	Continuing	Continuing
S0177	Vertical Launch STANDARD Missile	12,354	7,773	3,808	1,846	719	68,295
S1004	Vertical Launch Adaptation	5,387	6,621	3.985	5,659	Continuing	Continuing
S1035	Vertical Launch Test Missile	3,923	4,262	3.159	5,745	Continuing	Continuing
S1364	Vertical Launch TOMAHAWK	46,008	51,768	27,926	13,582	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops a Vertical Launching System for surface combatants for launching Anti-Air, Anti-Surface and Anti-Submarine Warfare missiles. The primary objective is to develop a system for integration with AEGIS/STANDARD Missile (Medium Range). The program also provides for procurement of test missiles and test support for Development and Operational Test and Evaluation and for integration of the Vertical Launching System with other missiles such as TOMAHAWK, HARPOON, and growth missiles, and their respective Weapons Control Systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue Vertical Launching System adaptation to STANDARD Missile 2 Block II, Medium Range (MR). Complete installation of TOMAHAWK and STANDARD Missile 2 Block II capable Vertical Launching System Preproduction Model (PPM-2) in USS NORTON SOUND (AVM-1). Support system integration testing in USS NORTON SOUND (AVM-1). Support land based testing, Technical Evaluation and initiation of Operational Evaluation of STANDARD Missile 2 Block II (MR), Vertical Launching System and AEGIS in USS NORTON SOUND (AVM-1). Complete environmental, integration and land based TOMAHAWK firing tests from Vertical Launching System. Continue definition of requirements to adapt the Vertical Launching System to growth missiles and missile types designated for vertical launch. Support Combat System integration at the AEGIS Combat System Engineering Development Site. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work and 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 result from the following changes: A net decrease of $791 in FY 1981, $1,135 in FY 1982 and $1,057 in FY 1983 due to inflation, economies, and travel reductions. In other changes in FY 1983, $5,078 was transferred from Projects S1004 (Vertical Launch Adaption) and S1035 (Vertical Launch Test Missile) to S1364 (Vertical Launch TOMAHAWK) to more accurately reflect where funds will be expended. In addition, $4,015 was added to Project

Program Element: 64353N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Vertical Launching System
Budget Activity: 4 - Tactical Programs

S1364 to provide for integration of the Vertical Launching System and the Common Weapon Control System with the DD963 Class Combat System (increase in scope of the program). VL/ASROC funding was decreased by 15,339 and 27,613 in FY 1982 and FY 1983 respectively, as the program was cancelled. Also in FY 1983, Project S1004 Vertical Launch Adaptation was decreased an additional $1,460 due to a Navy decision to transfer this amount into a higher priority 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	(52,244)	68,463	86,898	59,993	Continuing	Continuing
S0177	Vertical Launch STANDARD Missile	(12,995)	12,570	7,889	3,925	2,748	68,912
S0998	Vertical launch AEGIS	(9,266)	------	------	------	------	14,332
S1004	Vertical Launch Adaptation	(30,023)**	5,436	6,718	4,721	Continuing	Continuing
S1035	Vertical Launch Test Missile	------	3,957	4,324	4,388	Continuing	Continuing
S1364	Vertical Launch TOMAHAWK	------	46,500	52,628	14,346	Continuing	Continuing
S1504	Vertical Launch ASROC	------	------	15,339	27,613	Continuing	Continuing

* FY 1980 effort funded in Program Element 64358N (Vertical Launch STANDARD).
** FY 1980 funding includes $28.6 million for initiation of Vertical Launch/TOMAHAWK development.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
SCN	20,100	194,014	207,500	198,300	Continuing	Continuing
Procurement Quantity (Ship Sets, two 61 cell magazines per ship set)	------	(2)	(3)	(3)	Continuing	Continuing
SCN funds contained in Program Element 24292N (AEGIS Shipbuilding Project)						
OPN	------	65,780**	40,780	125,590	Continuing	Continuing
Procurement Quantity (Ship Sets, one 61 cell magazine per ship set)	------	(2)	(1)	(4)	Continuing	Continuing

** FY 1982 funds contained in TOMAHAWK Support Equipment, PE 28009 line 335326. FY 1983 and subsequent are under Budget Account 4, Surface TOMAHAWK Support Equipment.

Program Element: 64353N
Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program is based on the demonstrations conducted under Program Element 63358N, Weaponizing (Prototype), in which the feasibility of launching the STANDARD Missile from vertically mounted canisters was demonstrated. The objective is to develop a general purpose shipboard system for surface combatants capable of launching missiles for all warfare areas and adaptable to present and future surface launched missile and shipboard weapons control systems. Major advantages of the Vertical Launching System are: high firepower (greater missile magazine capacity per unit volume aboard ship, quick reaction and cycle time, no blind zones); enhanced availability (all missile cells immediately available, no single casualty can make system inoperable); flexibility (different weapons can be readily accommodated); relative simplicity (moving parts count is low thus reducing maintenance time and increasing reliability); low manning requirement and decreased vulnerability (no missile rounds on exposed launching rails or in topside launchers, each missile in magazine protected by an individual canister). The baseline project will develop a Vertical Launching System to interface with the AEGIS System and accommodate the STANDARD Missile 2 Medium Range Block I missile and be inherently adaptable to other present and future weapons and fire control systems. The adaptation project will develop the system modifications (detailed design and development) to accommodate STANDARD Missile 2 Medium Range Block II, and other weapons and interfaces with other fire control systems as designated in the future. The Test Missile project procures missiles to be used for program testing and supports tests. The Vertical Launch/TOMAHAWK Project develops and tests modifications to the Vertical Launching System and the TOMAHAWK Weapons System to expand the baseline Vertical Launching System to include a TOMAHAWK capability.

(U) RELATED ACTIVITIES: STANDARD Missile Improvements, Program Element 64366N; Area Air Defense, Program Element 64303N; TOMAHAWK Missile System, Program Element 64367; DDGX, Program Element 63589N

(U) WORK PERFORMED BY: In-House: Lead laboratory is the Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA. Others: Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Ordnance Missile Test Facility, White Sands, NM; Naval Weapons Center, China Lake, CA; Naval Weapons Station, Earle, Colts Neck, NJ; Fleet Analysis Center, Corona, CA; Operational Test and Evaluation Force, Norfolk, VA. Contractors: Martin Marietta, Baltimore, MD is the prime contractor. Others: RCA, Moorestown, NJ; General Dynamics/Pomona, Pomona, CA; General Dynamics/Convair, San Diego, CA; VITRO Laboratory/Automation Industries, Silver Spring, MD; Applied Physics Laboratory, Johns Nopkins University, Laurel, MD; McDonnell Douglas Astronautics Corporation, St. Louis, MO; Lockheed Missiles and Space Co., Sunnyvale, CA; Martin Marietta, Orlando, FL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: An advanced prototyping program demonstrated successful vertical firings of specially configured STANDARD 1 missiles, including high speed sled tests, and a conceptual rocket motor blast management system in January 1977. These tests provided a technical basis for initiation of full-scale development in FY 1977 of a shipboard

vertical launching system within volume constraints of Guided Missile Launching System MK 26 MOD 1 to be installed aboard AEGIS ships, as the initial objective. The baseline program provides for the integration of the Vertical Launching System with the AEGIS Weapon System and commenced with trade-off studies and life cycle cost analysis, and the development of weapon system specifications and requirements for a Preproduction Model-1 design. Initial development testing was conducted at the White Sands Missile Range with STANDARD Missile 1 Blast Test Vehicles and a restrained firing of a STANDARD Missile 1 MK-56 Rocket Motor which demonstrated the adequacy of the gas management system design. Interface documentation and modification requirements for the AEGIS Weapon System were developed. A feasibility demonstration of launching a TOMAHAWK missile vertically from its canister was successfully conducted in September 1979 and full scale development of Vertical Launch/TOMAHAWK was initiated. The Preproduction Model-1 was fabricated, assembled and tested. Integration tests were successfully performed. Canister certification as an ordnance shipping container for STANDARD Missile was completed. The AEGIS Weapon System in USS NORTON SOUND (AVM-1) was modified to provide compatibility with the Vertical Launching System. Adaptation of the Vertical Launching System for missiles other than STANDARD Missile 2 Block I commenced. The development of the Launch Control Test Equipment for use in software checkout, reliability and maintainability assessment, support of testing at White Sands Missile Range and interfacing with the AEGIS system at the Computer Program Test Site was completed. Top level specifications and interface design specifications for the Vertical Launch/TOMAHAWK configuration were initiated. Implementation of required hardware and software changes to the baseline Vertical Launching System, the TOMAHAWK missile and the TOMAHAWK Weapons Control System designs for compatibility commenced. The baseline Preproduction Model-1 was installed at White Sands Missile Range. Initial STANDARD Missile 2 Block I firings were successfully conducted from the Vertical Launching System. Successfully conducted the launch of a TOMAHAWK Land Attack Missile from the Engineering Development Model Vertical Launching System in November 1980, at the Pacific Missile Test Center. Installation of the Vertical Launching System Preproduction Model-1 in USS NORTON SOUND for at-sea Technical and Operational Evaluation was completed. Integration tests between AEGIS and Vertical Launching System were completed at the AEGIS Computer Program Test Site. Testing to evaluate the maintainability of the system in a shipboard environment was conducted and initial crew training was performed. Technical Evaluation of the baseline system was initiated. To date, four STANDARD Missile 2 Launch Test Vehicle firings have been successfully completed in USS NORTON SOUND (AVM-1). Preproduction planning began. Continued to develop modifications for STANDARD Missile 2 Block II (Medium Range). Continued to develop compatibility modifications to Vertical Launching System and TOMAHAWK. Additional STANDARD Missile Launch Test Vehicles were procured and utilized in Technical Evaluation.

2. (U) FY 1982 Program: Complete Technical Evaluation of AEGIS/Vertical Launching System/Standard Missile-2 BLOCK I capability. Operational Evaluation of the baseline Vertical Launching System will be conducted. Approval for service use for STANDARD Missile 2 capable Vertical Launching System, will be requested to allow initial production to begin later in FY 1982. Vertical Launching System adaptation for STANDARD Missile 2 Block II Medium Range will continue. Continue fabrication of additional test missiles to support STANDARD Missile 2 Block II Medium Range development testing. Conduct Vertical Launching System/TOMAHAWK Weapons Control System/TOMAHAWK Missile compatibility demonstration. Design, develop and test Vertical Launching System modifications resulting from baseline Technical and Operational Evaluation and support transition to production. Continue land-based firings of TOMAHAWK from Vertical Launching System at Pacific Missile Test Center, Point Mugu, California.

Program Element: 64353N Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Conduct tests and support firings at White Sands Missile Range to demonstrate compatibility of Vertical Launching System and STANDARD Missile 2 Medium Range Block II. Install TOMAHAWK and STANDARD Missile Block II capable Vertical Launching System (Preproduction Model 2) in USS NORTON SOUND (AVM-1). Support conduct of STANDARD Missile 2 (MR) Block II Technical Evaluation and initiation of Operational Evaluation. Continue transition to production. Continue requirements definition to integrate future growth missiles and weapons control systems into the Vertical Launching System. Conduct land-based firing of TOMAHAWK from Preproduction Model (PPM-2) Vertical Launching System at Pacific Missile Test Center, Point Mugu, California.

4. (U) FY 1984 Planned Program: Conduct Vertical Launching System and TOMAHAWK Technical Evaluation and Operational Evaluation in USS NORTON SOUND (AVM-1). Design, develop, fabricate and test Vertical Launching System modifications resulting from Technical and Operational Evaluations. Secure Approval for Service Use for STANDARD Missile 2 Medium Range Block II, TOMAHAWK capable Vertical Launching System. Continue to support transition to production. Provide additional test missiles to support testing commensurate with further maturity of STANDARD Missile 2 Medium Range Block II and TOMAHAWK.

5. (U) Program to Completion: Adapt the Vertical Launching System to support integration with other missile types such as Standard Missile-3 and future growth missiles and their fire control systems. Accomplish modifications to the Vertical Launching System to support development and operational tests ashore and afloat, provide test missiles and support testing for new missile and fire control systems that are designated to be compatible with the Vertical Launching System.

6. (U) Milestones:

Milestones		Date
1. Gas Management Development Testing		January 1978
2. STANDARD Missile Performance Tests		November 1978
3. Canister Certification as Shipping Container		August 1980
4. STANDARD Missile Compatibility Flight Test		January 1981
5. Technical Evaluation (AEGIS/STANDARD Missile) in USS NORTON SOUND	(October 1981)*	December 1981
6. Operational Evaluation (AEGIS/STANDARD Missile) in USS NORTON SOUND	(January 1982)*	February 1982
7. Approval for Service Use (AEGIS/STANDARD Missile Capable)		June 1982
8. Initial Production Decision (AEGIS/STANDARD Missile Capable)		June 1982
9. Technical Evaluation (TOMAHAWK capability) in USS NORTON SOUND	(March 1983)*	FY 1984
10. Operational Evaluation (TOMAHAWK capability) in USS NORTON SOUND	(June 1983)*	FY 1984
11. Approval for Service Use (TOMAHAWK capability)		FY 1984

* Date shown in FY 1982 Program Element Descriptive Summary. Delay in VLS TOMAHAWK Technical and Operational Evaluation in USS NORTON SOUND due to delay caused by including Battleship TOMAHAWK/Common Weapons Control System program being addded at a higher priority.

Program Element: 64353N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface

Title: Vertical Launching System
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: An advanced prototyping program that demonstrated successful vertical firings of specially configured STANDARD I missiles was concluded in January 1977. Initial engineering development testing, which demonstrated the adequacy of the gas management system design of the Vertical Launching System, was conducted at the White Sands Missile Range (WSMR) in January 1978 with STANDARD Missile I Launch Test Vehicles and a restrained firing of a STANDARD Missile MK 56 Rocket Motor. Compatibility test firings were conducted in November 1978 that confirmed that STANDARD Missile performance is not affected by vertical launch. A feasibility demonstration of launching the TOMAHAWK missile vertically from its canister was successfully conducted in September 1979. Integration testing was completed which demonstrated that VLS components, including computer programs, are compatible. Canister certification as an ordnance shipping container for STANDARD Missile has been completed. Initial STANDARD Missile 2 Block I (VL) firings were successfully conducted at WSMR from the Vertical Launching System. SECNAV direction for program expansion in October 1979 to include TOMAHAWK capability resulted in compatibility modifications to the Vertical Launching System. Subsequently, a TOMAHAWK (Land Attack) missile and a STANDARD Missile Launch Test Vehicle were successfully launched from the Vertical Launching System Engineering Development Model, modified for TOMAHAWK compatibility, at Pacific Missile Test Center, Pt. Mugu, CA, and White Sands Missile Range, NM. Integration tests between VLS and the AEGIS Weapons Control System were completed successfully at the AEGIS Computer Program Test Site, Moorestown, NJ. Testing to evaluate the maintainability of the system in a shipboard environment was conducted and initial crew training was completed. Technical Evaluation, including reliability determination of the Vertical Launching System, has commenced. To date, five STANDARD Missile 2 Launch Test Vehicles firings have been successfully completed in USS NORTON SOUND (AVM-1). Technical Evaluation of AEGIS/VLS/SM-2 Block I will be completed in FY 1982. Technical Evaluation of Vertical Launching System with TOMAHAWK/SM-2 Block II capability is planned for FY 1983. The Development Contractor is Martin Marietta Corporation.

2. (U) Operational Test and Evaluation: Operational Evaluation of Vertical Launching System commenced in 1981 with the successful evaluation of the Vertical Launching System canister operational suitability. No significant discrepancies were found. Action has been taken to correct minor discrepancies. Operational Evaluation of Vertical Launching System/AEGIS/STANDARD Missile 2 Block (VL) capability will be completed in FY 1982. Approval for Service Use is anticipated in the second quarter FY 1982. The Initial Production Decision will preceede a contract award for initial production, planned for June 1982. VL/SM-2 Block II and VL/TOMAHAWK Operational Evaluation will be conducted in FY's 1983 and 1984. Further operational testing will be conducted commensurate with the maturity of other weapons designated for use in the Vertical Launching System. COMOPTEVFOR (Commander Operational Test and Evaluation Force) will monitor all phases of DT&E and will conduct operational tests.

3. (U) System Characteristics: The Vertical Launching System is a guided missile launcher for surface combatants for launching Anti-Air-Warfare, Anti-Surface Warfare, Surface Strike Warfare and Anti-Submarine Warfare missiles. It is designed to simultaneously interface with up to three weapons control systems. The modular concept employed in the VLS design is based on an

eight missile module which is replicated to meet requirements of a ship class installation. One module in each magazine will contain a strikedown crane in the space of three missile cells to replenish canistered missiles in missile cells. Any missile type adapted for vertical launch can be located in any cell.

Required Characterictics:

Parameter	Goal	Threshold
1. VLS/AAW reaction time (seconds) (1)	[ ]	[ ]
2. VLS/AAW firing rate capability (missile/second) (2)	[ ]	[ ]

(1) Reaction time is defined as the time from missile select order to missile first motion, assuming no delay in fire order generation.

(2) Based on a multiple module system. Firing rate for a single module will be less than [ ] seconds per missile.

Demonstrated Performance to Date: VLS Technical Evaluation is underway and Operational Evaluation is planned for early 1982.

Project: S0177 Title: Vertical Launch STANDARD Missile
Program Element: 64353N Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project is based on the feasibility demonstrations conducted under Program Element 63358N, Weaponizing (Prototype), in which the capability of launching the STANDARD Missile from a vertically mounted canister was demonstrated. The objective of this project is to develop a Vertical Launching System for surface combatants to enable them to launch a variety of missiles for all warfare areas. This baseline project develops the Vertical Launching System to interface with the AEGIS System and the STANDARD Missile 2 Medium Range (MR) Block I. It also provides a design inherently adaptable to other present and future weapons and fire control systems.

(U) RELATED ACTIVITIES: STANDARD Missile Development, Program Element 64366N; AEGIS Weapons System Development, Program Element 64303N.

(U) WORK PERFORMED BY: In-House: Lead Laboratory is the Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA. Others: Naval Weapons Station, Earle, Colts Neck, NJ; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Ordnance Missile Test Facility, White Sands, NM; Fleet Analysis Center, Corona, CA; Operational Test and Evaluation Force, Norfolk, VA; Naval Evaluation Facility, Albuquerque, NM. Contractors: Martin Marietta, Baltimore, MD is the prime contractor. Others: VITRO Laboratory/Automation Industries, Laurel, MD; General Dynamics, Pomona, CA; Martin Marietta, Orlando, FL; Unidynamics Inc., St. Louis, MO; Metric Corporation, Fort Walton Beach, FL; Westinghouse Corp., Lima, OH; Spiroid Division, Illinois Tool Works, Chicago, IL; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In January 1977, an advanced Prototyping Program was completed that demonstrated successful vertical firings of specially configured STANDARD 1 missiles, high speed sled test firings, and a conceptual rocket motor blast management system. These tests provided a technical basis for initiation of Full Scale Development in FY 1977 with the initial objective of installation of a shipboard Vertical Launching System onboard TICONDEROGA (CG-47) Class ships within volume constraints of the Guided Missile Launching System MK 26 Mod 1. Weapon system specifications and requirements for a Preproduction Model (PPM-1) design were developed. Integration with the AEGIS Combat System and STANDARD Missile 2 Block I commenced. Planning and modifications for the installation of the Preproduction model in USS NORTON SOUND (AVM-1) were initiated. Initial Development Testing (DT-IIIA) was conducted at the White Sands Missile Range with STANDARD Missile 1 Blast Test Vehicles and a restrained STANDARD Missile (MK 56) rocket motor which demonstrated the adequacy of the gas management system design. Additional Development Testing verified no STANDARD Missile performance degradation due to plume effects. Brassboard level tests of Launch Control System electronics and acceptance tests of computer program modules were conducted. Canister certification as an ordnance shipping container for STANDARD Missile was successfully completed. Test data verified no detrimental effects on STANDARD Missile performance due to being packaged, handled or stored in Vertical Launching System canisters. Preparations for Vertical Launching System Preproduction Model installation in USS NORTON SOUND were completed. Test firings of STANDARD Missile 2

Project: S0177 — Title: Vertical Launch STANDARD Missile
Program Element: 64353N — Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare — Budget Activity: 4 - Tactical Programs

Block I from the Vertical Launching System, Preproduction Model (PPM-1) to demonstrate launcher/missile compatibility were conducted at White Sands Missile Range. The Vertical Launching System Preproduction Model (PPM-1) was then installed in USS NORTON SOUND for Technical and Operational Evaluations at sea. Testing to evaluate the reliability and maintainability of the Vertical Launching System in a shipboard environment was conducted, and crew training performed. Integration tests were completed at the AEGIS Computer Program Test Site, Moorestown, NJ. Technical Evaluation was initiated. The first event of Technical Evaluation in USS NORTON SOUND utilizing STANDARD Missile 2 Launch Test Vehicles was successfully completed. Preproduction planning began.

2. (U) FY 1982 Program: Successfully completed three test firing events in Technical Evaluation in USS NORTON SOUND (AVM-1) in October 1981. Technical Evaluation will be completed and Operational Evaluation will be conducted. Approval for initial production will be requested to allow initial production to begin in FY 1982. Modifications required as a result of the Technical and Operational Evaluations will be determined and development initiated. Support transition to production. Begin production.

3. (U) FY 1983 Planned Program: Incorporation of changes developed as a result of Technical and Operational Evaluations into the baseline design will be completed. Continue production transition support.

4. (U) FY 1984 Planned Program: Certify tactical ship operational software and continue to support transition to production.

5. (U) Program to Completion: Introduce the system into the CG-47 class ships and other classes as directed.

6. (U) Milestones:

Milestones		Date
1. Gas Management Development Testing (DT-IIIA)		January 1978
2. Missile Performance Test (DT-IIIB)		November 1978
3. Packaging, Handling, Shipping and Transportation Test (DT-IIIC)		August 1980
4. System Integration (DT-IIID)		October 1980
5. Canister Operational Evaluation (OT-IIIA)		June 1981
6. Pre-Ship Firing Test (DT-IIIF)		January 1981
7. AEGIS/Vertical Launching System Integration Tests (DT-IIIE)		February 1981
8. Technical Evaluation in USS NORTON SOUND (AVM-1) (DT-III G/H)	(October 1981)*	December 1981
9. Operational Evaluation (OT-IIIB)	(January 1982)*	February 1982
10. Approval for Service Use AEGIS/STANDARD Missile capable)		June 1981
11. Initial Production Decision		June 1982

* Dates shown in FY 1982 Program Element Descriptive Summary

Project: S0177 Title: Vertical Launch STANDARD Missile
Program Element: 64353N Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare 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
S0177	Vertical Launch STANDARD Missile	12,354	7,773	3,808	1,846	719	68,295

Project: S1094 — Title: Vertical Launch Adaptation
Program Element: 64353N — Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Vertical Launching System is being developed to be adaptable to a family of current and planned missiles and Weapon Control Systems. The baseline design of the system will be operationally tested and evaluated with the AEGIS System and the STANDARD Missile 2 (Medium Range) Block I. This project will provide for the design and development of the modifications necessary to expand the basic Vertical Launching System design to be compatible with other fire control systems and to launch other missiles including STANDARD Missile 2 Block II, and other present or future generation missiles as designated. The Vertical Launching System design allows adaptation to different ship classes for various missile types. These ship configurations will be based on the basic Vertical Launching System module, replicated to provide the size of magazine (number of cells) required for a specific ship class.

(U) RELATED ACTIVITIES: Standard Missile Development, Program Element 64366N; AEGIS Weapons System Development, Program Element 64303N; DDGX Combat Systems, Program Element 63589N; TOMAHAWK Missile System, Program Element 64367N.

(U) WORK PERFORMED BY: In-House: Lead Laboratory is the Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA. Others: Naval Weapons Station, Earle, Colts Neck, NJ; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA, Pacific Missile Test Center, Point Mugu, CA; Naval Ordnance Missile Test Facility, White Sands, NM; Naval Weapons Evaluation Facility, Albquerque, NM; Fleet Analysis Center, Corona, CA; Operational Test and Evaluation Force, Norfolk, VA. Contractors: Martin Marietta, Baltimore, MD is the prime contractor. Others: VITRO Laboratory Automation Industries, Silver Spring, MD; Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; RCA, Moorestown, NJ; General Dynamics, Pomona, CA, Martin Marietta, Orlando, FL; Metric Corporation, Fort Walton Beach, FL; Westinghouse Corporation, Lima, OH; Spiroid Division, Illinois Tool Works, Chicago, IL; and Unidynamics Inc, St. Louis, MO.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed Launch Control Test Equipment to support integration and testing of the Vertical Launching System with present and future missiles and fire control systems, and commenced utilizing the equipment for testing of the Vertical Launching System with the STANDARD Missile 2 Block I Missile and the AEGIS Weapons Control System. Began interface requirements definition and initiated design modifications to the Vertical Launching System for STANDARD Missile 2 Block II. Developed software modifications required to adapt the Vertical Launching System to additional missile types. Continued adaptation for new rocket motors and missiles identified for deployment from the Vertical Launching System.

2. (U) FY 1982 Program: Fabricate and assemble modifications to Vertical Launching System for compatibility with STANDARD Missile 2 (MR) Block II. Support conduct of Vertical Launching System and AEGIS (modified for STANDARD Missile 2 (MR) Block II) integration at Moorestown, NJ. Continue requirements definition to integrate the Vertical Launching System with future missile types, weapons control systems and ship combat systems.

Project: S1004 Title: Vertical Launch Adaptation
Program Element: 64353N Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue Vertical Launching System compatibility demonstration with STANDARD Missile 2 Block II including support of STANDARD Missile 2 (MR) Block II Technical Evaluation and initiation of Operational Evaluation. Continue requirements definition to integrate other current and future missiles that may be designated for Vertical Launch and associated weapons control systems, with the Vertical Launching System.

4. (U) FY 1984 Planned Program: Continue requirements definition in support of compatibility demonstrations between the Vertical Launching System and growth missiles and associated weapons control systems.

5. (U) Program to Completion: Develop Vertical Launching System hardware and software modifications to support compatibility of new missile propulsion, new missile types and weapons control systems designated for vertical launch. Continue firing and non-firing operations ashore and afloat to demonstrate Vertical Launching System compatibility with new or modified missile and weapon system configurations.

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
S1004	Vertical Launch Adaptation	5,387	6,621	3,985	5,659	Continuing	Continuing

Project: S1364 Title: Vertical Launch TOMAHAWK
Program Element: 64353N Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: In September 1979, A TOMAHAWK Missile (Anti-Ship variant) was launched from a vertical canister demonstrating the feasibility of vertically launching TOMAHAWK missiles. In October 1979, the Vertical Launching System Program was expanded to include Vertical Launch/TOMAHAWK to exploit the inherent advantages of the Vertical Launching System and provide a surface strike capability for surface combatants. CG-47, DD-963, and DDGX Class ships were identified to receive this capability. The purpose of this project is to develop and test the interfaces and modifications to the Vertical Launching System, TOMAHAWK missiles and the TOMAHAWK Weapons Control System to achieve a Vertical Launch/TOMAHAWK capability.

(U) RELATED ACTIVITIES: AEGIS Weapons System Development, Program Element 64303N; DDGX, Program Element 63589N; Combat System Architecture, Program Element 63568N; TOMAHAWK Missile System, Program Element 64367N.

(U) WORK PERFORMED BY: In-House: Lead Laboratory is the Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA. Others: Pacific Missile Test Center, Point Mugu, CA; Naval Surface Weapons Center, White Oak Laboratory, Silver Spring, MD; Naval Weapons Station, Earle, Colts Neck, NJ; Naval Ships Weapons System Engineering Station, Port Hueneme, CA; Naval Weapon Evaluation Facility, Albuquerque, NM; Naval Ordnance Missile Test Facility, White Sands, NM; Fleet Analysis Center, Corona, CA; Operational Test and Evaluation Force, Norfolk, VA. Contractors: Prime Contractor are: Martin Marietta, Baltimore, MD; General Dynamics/Convair, San Diego, CA; McDonnell Douglas Astronautics Corp., St. Louis, MO; VITRO Laboratories/Automation Industries, Silver Spring, MD. Others: Ingalls Shipbuilding Division, Pascagoula, MS; Martin Marietta, Orlando, FL; Unidynamics Inc., St. Louis, MO; Metric Corporation, Fort Walton Beach, FL; Westinghouse Corp., Lima, OH, Spiroid Division, Illinois Tool Works, Chicago, IL; APL/JHU, Laurel, MD; Lockheed Missiles and Space Co., Sunnyvale, CA; Williams Research Corp., Walled Lake, MI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: An initial feasibility demonstration was successfully conducted by firing a TOMAHAWK Missile (Anti-ship variant) vertically from a TOMAHAWK canister in September 1979. Detailed Vertical Launching System/TOMAHAWK program definition and planning were conducted. Developed changes to the top level specifications. Initiated interface design specifications development between the Vertical Launching System and TOMAHAWK Missiles and Weapons Control System. Defined hardware and software changes to the Vertical Launching System and the TOMAHAWK Missiles and Weapons Control System. Initiated TOMAHAWK Missile and Weapons Control System procurement for system testing. Completed requirements definition and initiated design changes to the Vertical Launching System. Began fabrication of Preproduction Model (PPM-1) launcher modules and canisters. Successfully conducted the launch of a TOMAHAWK Land Attack Missile from the Engineering Development Model Vertical Launching System in November 1980 at the Pacific Missile Test Center. Successfully conducted compatibility demonstrations of the Vertical Launching System (Engineering Development Model, modified for TOMAHAWK) and a STANDARD Missile Launch Test Vehicle to demonstrate adequacy of gas management system after sizing modifications to accommodate TOMAHAWK. Initiated environmental tests. Initiated Launch Control System/TOMAHAWK Weapons Control System integration tests. Procured

Project: S1364
Program Element: 64353N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Vertical Launch TOMAHAWK
Title: Vertical Launching System
Budget Activity: 4 - Tactical Programs

installation support material and initiated preparations for installation of the Vertical Launching System (PPM-2) and TOMAHAWK Weapons Control System in USS NORTON SOUND (AVM-1) for Technical and Operational Evaluation at-sea tests. Initiated Basic Alteration Class Drawing development for DD-963 Class ships.

2. (U) FY 1982 Program: Complete design changes and fabrication of TOMAHAWK capable Vertical Launching System Preproduction Model (PPM-2). Provide TOMAHAWK Missiles and conduct land-based missile firing tests from Vertical Launching System Module at Pacific Missile Test Center, Point Mugu, CA. Accomplish modifications to USS NORTON SOUND (AVM-1) for compatibility with Vertical Launching System Preproduction Model (PPM-2). Complete environmental testing. Conduct systems integration tests among the TOMAHAWK Weapons Control System, the Vertical Launching System and TOMAHAWK Missiles. Conduct Launch Control System Program Acceptance Tests.

3. (U) FY 1983 Planned Program: Conduct land based firing of TOMAHAWK Missile from Vertical Launching System Preproduction Model (PPM-2) to demonstrate compatibility prior to at-sea testing. Complete installation and system checkout in USS NORTON SOUND (AVM-1). Support Vertical Launching System transition to production for CG-47 and DD-963 Classes of ships.

4. (U) FY 1984 Planned Program: Conduct Technical and Operational Evaluation of TOMAHAWK/Vertical Launch in USS NORTON SOUND (AVM-1). Identify and develop modifications to Vertical Launching System resulting from Technical and Operational Evaluation. Obtain approval for service use for Standard Missile-2 Block II/TOMAHAWK capable Vertical Launching System. Support continuation of Vertical Launching System, TOMAHAWK Weapon Control System and AEGIS integration testing at Moorestown, NJ, and in USS NORTON SOUND. Support continuation of Vertical Launching System, TOMAHAWK Weapons Control System and DD-963 Combat System integration demonstrations. Continue to support transition of Vertical Launching System into production.

5. (U) Program to Completion: Support integration testing of Vertical Launching System, TOMAHAWK Weapon Control System/AEGIS Weapons Control System at Moorestown, NJ, Integrated Combat System Test Facility and in USS NORTON SOUND (AVM-1). Continue non-firing and firing operations ashore and at-sea commensurate with maturity of TOMAHAWK Missile and Weapon Control System.

6. (U) Milestones:

Milestone	Date
1. Program Definition	January 1980
2. DD-963 Configuration Study	May 1980
3. TOMAHAWK/Vertical Launching System Compatibility Test Firing	November 1980

Project: S1364 Title: Vertical Launch TOMAHAWK
Program Element: 64353N Title: Vertical Launching System
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare Budget Activity: 4 - Tactical Programs

4.	STANDARD Missile/Vertical Launching System (TOMAHAWK sized) Compatibility Firing	August 1981
5.	Packaging, Handling, Storage, and Transportation Demonstration Certification	July 1982
6.	Vertical Launching System/TOMAHAWK Weapons Control System/TOMAHAWK Integration Tests	October 1982
7.	Land Based Vertical Launching System/TOMAHAWK compatibility	November 1982
8.	System installation and checkout in USS NORTON SOUND (AVM-1)	1983
9.	Technical Evaluation in USS NORTON SOUND (AVM-1) (MARCH 1983)*	1984
10.	Operational Evaluation in USS NORTON SOUND (AVM-1) (JUNE 983)*	1984
11.	Approval for Service Use	1984

* Date listed in FY 1982 Program Element Descriptive Summary. Delay in VLS/TOMAHAWK Technical and Operational Evaluation caused by addition of battleship TOMAHAWK/Common Weapons Control System effort at a higher priority.

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
S1364	Vertical Launch TOMAHAWK	46,008	51,768	22,926	13,582	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64354N
Title: Air-to-Air Missile (AAM) Systems Engineering
DoD Mission Area: 231 - Anti-Air 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	37,062	35,350	23,844	0	0	254,003
W0614	AIM-54C Improvement	35,402	30,350	23,844	0	0	167,722
	(Quantity)	(IOT&E)					(45)
W0456	Short Range AAM Component Engineering	1,660	0	0	0	0	30,681
	(Quantity)	(IOT&E)					(69)
W0457	Medium Range AAM Component Engineering	0	5,000	0	0	0	55,600
	(Quantity)						(44)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: W0614 - This program provides development of improved missile units within the AIM-54 PHOENIX long-range air-to-air missile to meet the threat of the 1980s and 1990s. W0456 - The short range air-to-air product improvement program AIM-9M SIDEWINDER will increase guidance performance effectiveness of the current all-aspect SIDEWINDER AIM-9L to encounter the improved capability of the threat projected during the 1980s. W0457 - This program provides the improved monopulse seeker to the medium-range air-to-air and surface-to-air missile to meet the threat projected during the 1980's.

(U) BASIS FOR FY 1983 RDT&E REQUEST: W0614 - Starting in October 1981 and continuing through April 1982, thirty pilot production missiles will be delivered for Navy Technical Evaluation commencing in January 1982 followed by Operational Evaluation starting in September 1982. A study, completed by Johns Hopkins Applied Physics Laboratory in 1980, [

] program was begun in FY 1980 and is expected to continue through 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: The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: For W0614 in FY 1981 funding was decreased by 1,884 due to reprogramming actions, decreased 445 in Fy 1982 due to refinement of costs reducing escalation and increased by 12,787 in FY 1983

to support increased cost estimates for the operational test and evaluation, refinements in projected escalation estimates and program slippage due to late delivery of pilot missiles. Project W0457 increases by 5,000 in FY 1982 as a result of additional funds provided by Congress.

(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	46,495	39,131	30,805	11,057	0	188,140
W0614	Long Range AAM Component Engineering	38,010	37,286	30,805	11,057	0	157,274
	(Quantity)	(IOT&E)					(45)
W0456	Short Range AAM Component Engineering	8,485	1,845	0	0	0	30,866
	(Quantity)	(IOT&E)					(69)

(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
W0614							
	WPN	157,200	162,000	256,300	368,800	Continuing	Continuing
	QUANTITY	(210)*	(72)	(180)	(360)		
W0456							
	WPN	38,600*	51,100	41,471	33,297	Continuing	Continuing
	QUANTITY	(200)	(700)	(500)	(450)		
W0457							
	WPN	138,700	134,900	132,800	193,000	Continuing	Continuing
	QUANTITY	(625)	(585)	(670)	(1,220)		

* FY 1981 cost and quantity include 150 AIM-54A version missiles from foreign military sales, bought back from Iranian assets stored in the U.S.

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air Missile (AAM) System Engineering
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: WO614- This program provides performance and reliability improvements to the AIM-54 PHOENIX missile through development of (1) a digital electronics unit with auto-pilot functions; (2) an improved receiver/transmitter; and (3) an improved Target Detection Device. The digital electronics unit will be software programmable and will provide expanded capabilities against electronic countermeasures, high altitude targets, maneuvering targets, very low altitude encounters and clustered targets. The improved receiver/transmitter will include a frequency modulated transmitter and a frequency reference system and provide the capability to track through the target's beam aspect and to guide on targets in a stream raid. The improved Target Detection Device will be totally solid state and will provide expanded capabilities in adverse environments. These new units will provide a significant increase in missile reliability over the existing AIM-54A. WO456 - The AIM-9M, a product improvement of the AIM-9L, is the latest version of heat seeking infrared missiles forming the SIDEWINDER family. The AIM-9M, a short range air-to-air missile, will provide combat advantages not available in other missiles by providing infrared counter-countermeasures and by improving acquisition of threat aircraft against infrared clutter backgrounds while retaining all of the demonstrated guidance performance characteristics of the AIM-9L. The AIM-9M is a joint Navy/Air Force missile to be used on F-14, F-15, F-16 and F-18 fighter aircraft as well as on other aircraft currently carrying AIM-9L to enhance close-in combat against advanced threat aircraft. The guidance section of the AIM-9M is being repackaged to improve producibility and to accomodate increased complexities. A reduced smoke rocket motor is also being developed and will be compatible with both the AIM-9L and AIM-9M versions. The program has successfully completed the Joint Navy and Air Force Operational Test phase and a production decision was approved on 27 April 1981. WO457 - The SPARROW Improved Monopulse Missile (AIM/RIM-7M) is a medium range air-to-air missile using semi-active radar guidance with an external configuration similar to previous AIM-7 SPARROW missiles. This improved seeker possesses the capability to process both pulse doppler and continuous wave signals and features solid state electronics. The monopulse technique processes guidance information through logic circuits and provides increased effectiveness in the look-down/heavy-clutter and ECM environments. The AIM/RIM-7M seeker, coupled with the AIM-7F missile components, will provide an improved, mid-range, air-to-air missile for the F-14, F-15 and F-18 for 1980 and beyond. The RIM-7M will be the SEASPARROW surface-to-air point defense missile. The AIM/RIM-7M advanced development was a two-contractor competitive prototype effort. The Raytheon Company was selected for engineering development.

(U) RELATED ACTIVITIES: The AIM/RIM-7M, WO457, development is a joint service effort involving both the Navy and the Air Force. Funding for this effort is also under Program Elements 25658N, 64305N, and 63316F.

(U) WORK PERFORMED BY: WO614 - The digital electronics unit, improved receiver/transmitter, and the digital autopilot are being developed by Hughes Aircraft Company, Canoga Park, CA. The improved Target Detection Device is being developed by the Naval Weapons Center, China Lake, CA. Testing is being conducted at the Pacific Missile Test Center, Point Mugu, CA. Navy technical support is provided by Naval Air Development Center, Warminster, PA. WO456 - Naval Weapons Center, China Lake, CA is the developing activity. Raytheon Company, Lowell, MA, has built the engineering, pilot production guidance control sections, and is currently producing the first production procurement. Testing was performed at the Pacific Missile Test Center, Point Mugu, CA, Naval Weapons Center, China Lake, CA, White Sands Missile Range, NM, and Eglin AFB, FL. WO457 - Navy in-house work is performed

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air Missile (AAM) System Engineering
Budget Activity: 4 - Tactical Programs

at the Naval Weapons Center, China Lake, CA, and tested at the Pacific Missile Test Center, Point Magu, CA. The prime contractors are Raytheon, in Lowell, Massachusetts, and General Dynamics in Pomona, CA. W1617 - The Naval Weapons Center, China Lake, CA is the developing activity.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0614 - The PHOENIX improvement program commenced in FY 1977 for design and development of the digital electronics unit, improved receiver/transmitter and target detection device. A contract was awarded for the design, development and fabrication of the fifteen engineering development model missiles. These missiles are being utilized in an intensive flight test program. As of 30 September 1981, the first six (6) launches have been completed. The first three were successful - the fourth failed early in flight due to a short in a power unit, since redesigned. The fifth launch objectives were a repeat of the fourth, and it was highly successful. The sixth launch was also successful. In addition, engineering development models have successfully completed more than 330 captive carry flights, totaling more than 586 hours. More than 1400 Missile-on-Aircraft-Tests and 20,000 simulated launches have been conducted. In captive flight tests the missile has demonstrated target tracks in all guidance modes. All specification requirements continue to be met for this stage of the program. The pilot production missiles are in fabrication with first delivery in October 1981. Electronic Counter Countermeasures modifications to the AIM-54C guidance software and tests to validate these changes were initiated and will be completed in FY 1983. W0456 - The Sidewinder product improvement program to improve missile performance commenced in late FY 1976. A contract for Raytheon to build the engineering and pilot production units was signed in 1977. A contract for the development of reduced smoke rocket motor was awarded to Thiokol Corp. in September 1978 and completed in June 1981. Joint Navy/Air Force development testing and Initial Operational Test and Evaluation commenced in February 1980 and was completed in March 1981. Twenty-seven of thirty-eight firings were successful, sixteen of which were against targets[ ] A production decision was made in August 1981 and production at Raytheon was initiated in May 1981. W0457 - Successfully completed the contractor technical evaluation in August 1980 and the joint technical evaluation. Operational Evaluation commenced in June 1981. [ ]

2. (U) FY 1982 Planned Program: W0614 - In October 1981, the pilot production missiles will start delivery for Navy test programs. The Navy Technical Evaluation is planned to start in January 1982 followed by the Operational Evaluation starting in late FY 1982 at the Pacific Missile Test Center. A complete description of these test programs is contained under Test and Evaluation Data. W0456 - Deploy initial producton missiles and complete follow-on test and evaluation. W0457 - During FY 1982 reliability problems will be corrected. Initial Operational Test and Evaluation will be restarted with production missiles to verify reliability. Twenty of the first thirty production missiles will be used for Initial Operational Test and Evaluation captive carry reliability demonstration, beginning in the January to February 1982 time-frame. Performance improvements will be



contained in the software build to be in production missile number 41 and subsequent, and these missiles will be used for Initial Operational Test and Evaluation firing tests. Completion of Initial Operational Test and Evaluaton is now scheduled for June 1982.

3. (U) FY 1983 Planned Program: W0614 - Continuation and completion of the Operational Evaluation with analysis of the Operational Evaluation funding and follow-on Test and Evaluation commencing in late FY 1983. A full rate production decision is anticipated in October 1983. The first sixty low rate production missiles will be deployed in a fleet captive carry test program. W0456 - Continue Sidewinder AIM-9M production. W0457 - Not applicable.

4. (U) FY 1984 Planned Program: W0614 - Complete Follow-on Test and Evaluation. W0456 - Not applicable. W0457 - Not applicable.

5. (U) Program to Completion: W0614 - Not applicable. W0456: Not applicable. W0457: Not applicable.

6. (U) Milestones:

Milestone		Date
W0614 (AIM-54C)		
a. Commenced Engineering Development		October 1976
b. Pilot Production Review		September 1980
c. Complete Engineering Development		December 1980
d. Initiate Operational Test and Evaluation		September 1982
e. Full Production Decision	(January 1983)*	October 1983
f. Initial Operational Capability		[redacted]
W0456 (AIM/RIM-7M		
a. Commenced Engineering Development		January 1976
b. Completed Engineering Development		March 1979
c. Complete Joint Technical Evaluation		August 1980
d. Complete Initial Operational Test and Evaluation	(November 1980)*	March 1981
e. Production Decision	(January 1981)*	April 1981
f. Incorporate into Production	(February 1981)*	May 1981
g. Initial Operational Capability	(August 1982)*	[redacted]

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air Missile (AAM) System Engineering
Budget Activity: 4 - Tactical Programs

WO457

a.	First deliveries of Test and Evaluation Missiles	December 1979
b.	Contractor Development Test (completed)	August 1980
c.	Joint Technical Evaluation (completed)	June 1981
d.	Long Lead Production Decision	August 1980
e.	Initial Operational Test and Evaluation (commenced)	December 1980
f.	Production Decision	

* Date shown in FY 1981 Program Element Descriptive Summary.

WO614: Change in item E was to allow for completion of Operational Evaluation and review of potential failure analysis, prior to full production decision.

WO456: The change in item d occurred due to problems associated with range and target availabilities.
The change in item e occurred due to delay of item d.
The change in item f occurred due to delay of item e.
The change in item g occurred due to delay of item f.

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air (AAM) Systems Engineering
Budget Acitivty: 4 - Tactical Programs

TEST & EVALUATION:

1. (U) Development Test and Evaluation (DT&E):

a. (U) The PHOENIX missile development and testing was initiated in 1963, with Hughes Aircraft Company as the development contractor.

(U) In response to SOR W16-08, the basic missile design was created and verified during the initial DT&E phase fom 1963 to 1969. This stage utilized 37 missiles, 10 for laboratory testing and the others as flight test launch missiles. These laboratory tests demnstrated alert readiness, handling shock and vibration resistance, and structural integrity with satisfactory margins of safety. The flight test verified basic design performance. As a partial result of these tests, a new specification was drawn up in 1968 incorporating improvements in clutter processing, aircraft separation characteristics, and data link design. Sixteen missiles were built and tested in this specification, with 14 of the missiles being launched through 1970. One of the sixteen missiles was selected to undergo a specified reliability test program to determine captive and free flight reliability achievements. These tests were successfully completed in 1971. To improve producibility and reduce cost, a Value Engineering effort was initiated in 1968. Design improvements were incorporated that reduced missile cost by approximately one-third. Design changes ranged from simplifying the wing design to internal electronic changes such as replacing transmitter and electronics unit devices. Each unit of the missile (seekerhead, receiver transmitter, electronics unit, battery, electrical conversion unit, etc.) benefited from these changes. Six Value Engineering missiles were introduced into a further Production Improvement Program. The major Production Improvement Program changes were a digital processor, alternate mid-course guidance, and replacement of the low frequency codewood circuits with an open formed circuit board design. The Value Engineering and Production Improvement Program missiles were launched in 1971 and 1972.

(U) Design and producibility changes from the Value Engineering and Production Improvement Program efforts were incorporated into the sixty-nine pilot production missiles which were delivered in 1972. Pilot production missiles were produced in four different versions. Each new version introduced reliability, maintainability, and performance improvements. The final pilot production missiles resulted in the production AIM-54A PHOENIX which commenced delivery in 1973.

(U) A "Dry" missile design (X-AIM-54B) effort was initiated in January 1972, which included modification of 7 missiles (6 pilot production IVE/PIP). The "Dry" PHOENIX simplifies the design of eliminating liquid cooling provisions. After 2 successful flight test launches, the "Dry" missile program was cancelled because it was not cost effective.

(U) Since the initial AIM-54A production deliveries in 1973, there have been three performance improvements incorporated into production and retrofitted into existing inventory missiles. These are the reject image device for improved low altitude performance (1974), high altitude peformance improvements (1975), and extended active gate for improved electronic counter-

counterneasures performance (1977). All three of these changes were verified by successful launches of modified production missiles. A separate reliability upgrade program was also initiated in 1975. This program resulted in changes in the production processes and procedures to include stress screening of components, additional test thoroughness and incorporation of high reliability parts.

(U) An improved PHOENIX missile (AIM-54C) development program commenced in 1976. This program will improve air-to-air performance against high/low maneuvering targets, expand launch zones, improve clutter immunity and electronic counter-countermeasures capability and improve operational readiness and reliability in order to counter the threat during the 1980's and 1990's. The Mean Time Between Failure and Missile-on-Aircraft Test difficulties in the AIM-54A are being corrected in the AIM-54C improved missile.

(U) Contractor test and evaluation is being conducted on engineering development missiles by the contractor, Hughes Aircraft Company. Fifteen engineering development model missiles were procured during development. Laboratory and qualification testing is being performed by the contractor at chassis/subassembly, unit, section, and missile levels. The objectives of the laboratory tests are to verify basic design concepts, ensure (within constraints of laboratory testing) the design meets performance, environmental, and reliability requirements and to prove workmanship, manufacturing processes, and functional operation prior to integration and higher level testing. Performance margin testing is performed at component and unit levels to verify usable performance margin. Environmental design and qualification criteria are based on a life cycle missile profile and stess analysis. The environmental tests include vibration, fatigue, shock, thermal, contaminants, moisture, and radar frequency interference. Assurance tests are conducted at chassis, unit and section levels to accelerate exposure of defects by application of stresses. To accelerate reliability growth, all testing is performed on a test, analyze and fix basis. Each failure, at all hardware levels, is analyzed and the required corrective action incorporated and verified in the test hardware. A joint contractor/Navy captive flight and launch program is being conducted on the engineering development missiles. These flight tests evaluate technical performance. A total of eleven missiles will be captive flown and launched by Navy flight crews. Mission profile qualification tests will be performed on the missiles at Pacific Missile Test Center to permit an assessment of production quality control and to supplement other captive flight test results. The missiles are being moved on standard PHOENIX missile handling equipment. The PHOENIX Guided Missile Test Set (GMTS) will be modified at the Pacific Test Center in order to test the AIM-54C missile and still retain basic AIM-54A test capability. As of 25 September 1981 there have been a total of six launched. The fourth launch on 22 September 1980 was a failure due to an electrical problem within the missile. The fifth launch on 8 May 1981 was successful and completed mission requirements of the failed missile. The most recent launch (#6) was on 26 August 1981 and was extremely successful. It was a long range, [ ] shot against a target [ ] The result was a direct hit. At this time the reliability requirement of [ ] meantime between failure has been demonstrated with at least [ ] confidence level. Captive carry time presently exceeds the Test and Evaluation Master Plan criteria of [ ] Three additional launches will be conducted by the end of calendar year 1981. In test results to date, the missile has met specification requirements [ ]

[ ] In captive flight tests, the missile has demonstrated [

Pilot production missiles will be utilized by the Pacific Missile Test Center (PMTC) in a Navy Technical Evaluation (NTE) starting June 1982 to determine conformance with specification requirements. Six missiles will be subjected to a laboratory reliability evaluation to establish a baseline for future government acceptance tests on production missiles. Three missiles will be captive flight tested and launched. Additional tests will be conducted on missile-on-aircraft-test (MOAT), built-in-selt-test (BIST), electronic counter-countermeasures, electro-magnetic interference/vulnerability, and safety characteristics. Modified ground support test equipment, test procedures, and manuals will be utilized to evaluate proper support. An Operational Evaluation will be conducted by VX-4 at Pacific Missile Test Center shortly after the Navy Technical Evaluation using the pilot production missiles. A total of 15 AIM-54C's will be fired using a variety of operational scenarios and targets to determine if the missile meets its NDCP requirements

b. (U) The most significant aspect of test experience to date has been the high success rate of AIM-54A missile firings. The data in the chart below is grouped to show overall results for all AIM-54A firings through 18 September 1981:

	All Launches TA-3B, F-111, F-14	F-14/AIM-54A
Launches 1/	[	]
No tests		
Valid Firings		
Guided Successfully 2/		
Guide & Fuse Successfully		
Guide Success (%) 3/		
Guide & Fuse Success (%)		

Notes: 1/ Includes Operational Evaluation (OPEVAL) firings
2/ Within [ ] of the target (lethal warhead radius)
3/ Successful performance considering only valid firing tests. (no-tests excluded)

Additionally, many of these successes cannot be accomplished with any other known air intercept missile and weapons systems. In addition to the 67 missiles launched by the contract, there have been 7 launched during Board of Inspection and Survey trials, 22 by Pacific Missile Test Center (PMTC), 33 by Air Test and Evaluation Squadron Four (VX-4) (OPEVAL), and 87 by Operational Squadrons (VF-1, VF-2, VF-14, VF-24, VF-32, VF-41, VF-51, VF-84, VF-111, VF-114, VF-142, VF-143, VF-211, and VF-213,).

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air (AAM) Systems Engineering
Budget Acitivty: 4 - Tactical Programs

c. (U) During the 2nd Quarter FY 1973, for the first time in the history of air-to-air combat, a single aircraft, an F-14A fighter, [

d. (U) The PHOENIX[

e. (U) [

f. (U) The F-14/PHOENIX Weapon System was designed to counter fighter/bomber size targets. Current tactics emphasize destruction of bombers carrying missiles prior to launch. [

To date, [

g. (U) The PHOENIX missile is a primarily a long range intercept missile; however, it does have capability against targets maneuvering at short ranges. [

2. (U) Operational Test and Evaluation (OT&E)

a. (U) The PHOENIX missile program preceded Department of Defense and Navy test and evaluaton policies now incorporated in OPNAVINST 3980.10. Accordingly, the missile was authorized for production before Operational Test and Evaluation was completed.

b. (U) Air Test and Evaluation Squadron FOUR (VX-4), Point Mugu, California, prosecuted PHOENIX Operational Test and Evaluation for Commander Operational Test and Evaluation Force (COMOPTEVFOR). Some limited initial Operational Test and Evaluation (Initial Operational Test and Evaluation) under Project C/V-21 was conducted in November 1972. More extensive IOT&E under C/V-21 was conducted in late 1973 and early November 1974. Operational Test and Evaluation was continued during Operational Evaluation (Project O/V-118) to verify weapons system improvements and to continue tactics development. Prosecution of O/V-118 included the unexecuted portion of C/V-21, while at the same time operationally testing the F-14A against current and projected operational threats. Particular emphasis was placed on PHOENIX capability in the Maritime Air Superiority (MAS) environment. MAS testing, completed in July 1976, evaluated the weapons system and developed initial tactics against anticipated threats in both clear and ECM (electronic countermeasures) environments. The F-14A/PHOENIX OPEVAL (O/V-118) was redesignated Project 146-OT-III.

(1) (U) OPEVAL

(2) (U) During operational testing,

(3) (U) During OT&E, an extensive PHOENIX captive carry program had been prosecuted using both VX-4 and deployed fleet F-14A squadrons. Contractual specifications

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air (AAM) Systems Engineering
Budget Acitivty: 4 - Tactical Programs

(4) (U) An additional purpose of the captive carry program was to determine MOAT (Missile-On-Aircraft-Test) effectiveness. CNO Project 146-OT-III results demonstrated that MOAT was an unreliable method of determine true missile status. Fleet testing has not changed this conclusion.

c. (U) FOT&E (Follow-on Operatonal Test and Evaluation) has been conducted by COMOPTEVFOR. The primary objective was to evaluate the operational effectiveness and suitability of the AIM-54A PHOENIX Missile in use by fleet units. Recent missile launches by VX-4, PMTC and selected fleet units have augmented the OT&E Data Base. FOT&E F-14/PHOENIX Firing results are summarized below:

Date	Unit	Altitude Feet Missile F-14 Target	Speed (MACH) F-14 Target	Launch Range NM	Remarks
1/30/80	PMTC				
2/61/80	VX-4				
3/5/80	VX-4				
3/5/80	VX-4				
6/10/80	VX-4				
6/10/80	VF-32				
2/16/81	VF-51 1/				
2/16/81	VF-51 1/				
2/17/81	VF-111 2/				
2/17/81	VF-111 2/				
3/9/81	VF-114				
3/9/81	VF-213				
3/10/81	VF-213				
6/18/81	VF-41 3/				

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DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air (AAM) Systems Engineering
Budget Activity: 4 - Tactical Programs

6/18/81	VF-84
6/19/81	VF-41
6/19/81	VF-84
7/8/81	VF-142
7/8/81	VF-143
8/12/81	VF-114 3/

Notes:

Recent test results

coordination contributed significantly to successful results in all cases. Fleet E-2C aircraft provided excellent GCI information during intercepts against (RARPO(N) and BQM-34 drones.

d. (U)

Program Element: 64354N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Air-to-Air (AAM) Systems Engineering
Budget Acitivty: 4 - Tactical Programs

3. (U) Characteristics Section

From the extensive flight testing of the AIM-54A PHOENIX missile to date, the following characteristics have been demonstrated in close simulation of tactical environments.

a. Performance	Objective	Demonstrated	Test Activity
Maximum Airspeed	2.2	1.6	Contractor
Launch	2.2	1.6	Contract (CDT)
Missile Flight	Not Specified	4.3 MACH	
Range (NM)			
Maximum (missile flight)	50	72.5	Contractor
Minimum	Not Specified	2.1	JET
Reliability			
Captive Flight Hour Limit	72 hrs (80%)	56 hrs (80%)	Fleet Captive Carry COFT/VX-4 (monitor)
Operating Altitude			
Maximum	80,000 feet	81,000 feet	
Minimum	200 feet	50 feet	

b. Description	Objective	Demonstrated
Launch Weight (lbs)	1000	985
Warhead Weight (lbs)	130	133.5
Length/Span (ft)	13/3	13/3
Guidance Type	Semi-Active Mid-Course Active Terminal	Semi-Active Mid-Course Active Terminal

[redacted] [redacted]

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64358N
Title: Close In Weapon System (PHALANX)
DoD Mission Area: 231 - Anti-Air 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	2,105	1,371	1,387	1,329	4,252	139,938
S0172	Close In Weapon System (PHALANX)	2,105	1,371	1,387	1,329	4,252	139,938

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: PHALANX is a fully automatic, extremely fast reaction terminal defensive gun system designed for a large variety of Navy ships. The system has been designed to defeat low-flying, subsonic and supersonic anti-ship missiles which have been rapidly proliferating in Soviet, Satellite and Third World Fleets over the past two decades.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 funds requested will be used to complete development, test, and evaluation of an improved fire control algorithm under development at the Naval Surface Weapons Center, Dahlgren, VA. The new algorithm will be incorporated into PHALANX in order to maintain high kill probability against expected future highly maneuvering targets. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT 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 108 (20 in FY 1981, 53 in FY 1982 and 41 in FY 1983) due to a reduction in inflation. Total program cost increased 1,072 resulting from an extension of the threat evaluation effort into FY 1987.

(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	2,137	2,125	1,424	1,428	4,395	138,866
S0172	Close In Weapon System (PHALANX)	2,137	2,125	1,424	1,428	4,395	138,866

Program Element: 64358N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Close In Weapon System (PHALANX)
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
WPN*	133,100	134,700	118,740	141,600	530,500	1,318,852
Quantity	(52)	(49)	(39)	(42)	(122)	(395)
SCN	37,300	50,800	62,100	54,200	121,300	502,500
Quantity	(12)	(13)	(14)	(12)	(22)	(123)
OPN (All Ammo)**	17,869	18,040	20,374	24,812	135,300	221,300
WPN (Spares)	17,400	5,400	9,093	14,763	13,479	93,323
WPN (Mods)		1,200	4,400	11,500	193,100	210,200

* Due to reductions in earlier procurements, inflation and increases in system costs, only 52 systems could be purchased in FY 1981, an initial buy of 7 systems. This has resulted in an increase of two units in FY 1987.

Program Element: 64358N
Title: Close In Weapon System (PHALANX)
DoD Mission Area: 231 - Anti-Air Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The PHALANX Close-In Weapon System has been developed to counter the Anti-Ship Missile threat. PHALANX is designed to play a key role in the defense-in-depth concept by providing terminal or "last chance" defense against Anti-Ship Missiles which penetrate through longer range area and point defense systems. When installed on a ship with no other defenses, Close-In Weapon System provides an autonomous, stand alone, defensive capability. The system is an automatic, self-contained unit consisting of a search and a track radar, digitalized fire control system and a 20mm M61A1 gun, all mounted in a single above deck structure requiring a minimum of interface with other ship's systems. When operating automatically (the primary mode of operation) the system continually searches the horizon in an envelope reaching out to [redacted] in elevation and 360 degrees in azimuth(limited by ship's structure). Its operational sequence is as follows: the search radar, rotating at 90 rpm, normally detects and evaluates a potential target by comparing target parameters (speed and angle of approach) with potential threat data stored in the fire control computer. After the target is declared a threat, it is handed over to the track radar. The system computes the correct open fire range at which time the very high rate-of-fire gun automatically begins firing at the threat. From that point on, the fire control system compares the incoming target with the centroid of the stream of projectiles in the vicinity of the target and generates gun aiming orders to move the stream of projectiles on the target. The projectiles, made of an inert, very dense material, are capable of penetrating through the entire forebody of an incoming missile causing a warhead reaction which will lead either to a deflagration or detonation.

(U) RELATED ACTIVITIES: None

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center. Dahlgren, VA (Lead Laboratory); Technical Support Agent - Naval Ordnance Station, Louisville, KY. Contractor: General Dynamics, Pomona, CA (Prime Contractor); Major subcontractor - General Electric Corporation, Burlington, VT and Pittsfield, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Two most important considerations for any "last chance" terminal defense system - high equipment reliability and high probability of kill (lethality) - have been clearly demonstrated by Close-In Weapon Systems. Since program inception, Navy has conducted an extensive lethality test program which included land-based tests against Navy Laboratory-constructed replicas [redacted] All lethality tests were successful and the contractor fabricated two engineering prototypes which are functionally equivalent to the design intended for production. During Initial Operational Test and Evaluation in early 1974, while installed in USS KING (DDG-44) Prototype #1, achieved a total system Mean Time Between Failure (MTBF) of about 50 hours. That same prototype, after a breaking-in period, matured to an Mean Time Between

Failure (MTBF) rate of approximately 80 hours; the value originally specified by the Navy. During this time, Prototype #2 was used to proof system changes designed to enhance reliability of the Operational Suitability Model. The Operational Suitability Model was installed in USS BIGELOW (DD-942) at Mayport, Florida, for contractor and Navy technical evaluation and operational evaluation. These were completed in July 1977. Concurrently, since safety considerations severely restrict testing of terminal defense systems aboard manned ships, Prototype #1 was installed at the special Navy test site on San Nicolas Island for tests against stream raids using jet powered drones as targets. Both the Operational Evaluation and San Nicolas Island test were highly successful and led to Chief of Naval Operations approval for service use in August 1977 and a Defense Systems Acquisition Review Council III approval for full production in September 1977. During FY 1978 the Navy continued extensive testing of the [ ] velocity-capability change while completing certain portions of the integration design work required. Study and design of a modification for high elevation [ ] automatic search continued. During FY 1979, Navy completed extensive testing of the [ ] velocity-capability change and the integration design work required. Design work on an automatic high elevation search capability was accelerated and the initial build-up of proofing hardware was started. In September 1979, Prototype #2 (upgraded to production configuration) successfully engaged [

2. (U) FY 1982 Program: During FY 1982, testing of the expanded search capability will be completed. Development of the increased capacity magazine and adaptive fire rate will continue and test and evaluation of these changes will be completed. Examination of apparent threat changes will be conducted to determine system changes, if any, needed to maintain or improve operational effectiveness.

3. (U) FY 1983 Planned Program: Development of threat-modulated system changes will be pursued. Evaluation of a new fire control algorithm developed by Naval Surface Weapons Center, Dahlgren will be conducted.

4. (U) FY 1984 Planned Program: Evaluation of the Dahlgren algorithm will continue, utilizing various threat models.

5. (U) Program to Completion: Threat changes will continue to be scrutinized for applicability to PHALANX. Testing will be conducted as necessary, to provide confidence of any proposed changes.

6. (U) Milestones:

	Milestone	Date
a.	Advanced Development of PHALANX	Nov 1970
b.	Start engineering Development	Dec 1970
c.	Lethality Tests Against Threat Replicas	Oct 1971
d.	Complete Fabrication Engineering Development Model (Pre-Prototype)	May 1972

Program Element: 64358N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Close In Weapon System (PHALANX)
Budget Activity: 4 - Tactical Programs

	Milestone		Date
e.	Complete Engineering Development Model (Pre-Production) Testing		Sep 1972
f.	Defense Systems Acquisition Review Council II		Dec 1972
g.	Begin Reliability Upgrade Program (SEE NOTE (1))		Jan 1973
h.	Begin At-Sea Initial Operational Test and Evaluation of Prototype #1		Aug 1973
i.	Complete Initial Operational Test and Evaluation of Prototype #1		Mar 1974
j.	Begin Lethality Testing Against western Cruise Missiles; Award Operational Suitability Model Contract		Jun 1974
k.	Complete First Dynamic Lethality Test Against Actual Soviet Threats		Oct 1975
l.	Complete Second Dynamic Lethality Test		Feb 1976
m.	Complete Fabrication of Operational Suitability Model		Oct 1976
n.	Complete Tactical Missiles Tests, Terminate Operational Suitability Model Contract		Oct 1976
o.	Deliver #1 Operational Suitability Model		Nov 1976
p.	Commence At-Sea Operational Test and Evaluation		May 1977
q.	Complete At-Sea Operational Test and Evaluation		Jul 1977
r.	Approval for Service Use		Aug 1977
s.	Defense Systems Acquisition Review Council III		Sep 1977
t.	Production Contract Award		Dec 1977
u.	Complete Testing of High Velocity Modification		Sep 1978
v.	Initial Operational Capability - First Production Run		Aug 1979
w.	Complete Testing of High Angle Search	(Apr 1981)*	Nov 1981
x.	Complete Testing of Increased Capacity Magazine and Adaptive Fire Rate	(Sep 1981)*	[redacted]
y.	Program to Completion		

NOTE: (1) Reliability upgrade program will continue throughout the life of the program subject to availability of funds and attendant payoffs.

*Date shown in FY 1982 Descriptive Summary. Change resulted from RDT&E funding constraints.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64360N
Title: High Speed Anti-Radiation Missile
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	72,641	20,898	1,932	1,976	3,000	328,367
W0553	High Speed Anti-Radiation Missile	67,943	13,486	1,932	1,976	3,000	328,367
W1240	Aircraft Integration	4,698	5,412	*	*	*	*

* Funding transferred to PE 24134N Project W1638 A-6E Weapons Integration

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: A joint Navy/Air Force program to develop a defense suppression weapon system capable of destroying or rendering inoperative the land and sea based radars of enemy air defense systems. The High Speed Anti-Radiation Missile Weapon System includes the missile, associated aircraft avionics, necessary support equipment, and integration into the A-7E, F/A-18, and A-6E aircraft. It will offer major improvements over SHRIKE and STANDARD Anti-Radiation Missiles and will ultimately replace both of them. High Speed Anti-Radiation Missile provides a

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete deliveries of Pilot Production missiles for complete joint Navy and Air Force Operational Evaluation, deliver missile, avionics and support equipment for F/A-18 integration. Continue development of missile capability for the A-6E aircraft. 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 total program estimate decreased by $15 as a net result of the following individual project changes: High Speed Anti-Radiation Missile (W0553) funding decreased by $58 due to inflation reduction (-$43) and reprogramming to P.E. 64710N Navy Energy Program (-$15). Aircraft Integration (W1240) funding increased by $43 due to the FY 1982 PEDS reflecting $4,655, (-$42) for inflation reduction, but the decrease was taken from W0553, therefore W1240 remains $4,698. The FY 1982 total program estimate decreased by $94 for inflation reduction (-$98)

for W0553, (-$6) for W1240. The FY 1983 total program reflected in the FY 1982 Descriptive Summary as TBD is now shown in estimated dollars.

(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	63,760	72,656	20,992	TBD	TBD	TBD
W0553	High Speed Anti-Radiation Missile	63,760	68,001	15,574	TBD	TBD	TBD
	(Test and Evaluation Quantity)						(99)
W1240	Aircraft Integration	0	4,655	5,418	0	0	10,110

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
WPN -	126,900	112,000	180,400	156,600	TBD	TBD
Quantity	80	134	208	327	6,308	7,057

Program Element: 64360N
DoD Mission Area: 232 - Amphibious, Strike, and Surface Warfare

Title: High Speed Anti-Radiation Missile
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The mission of the High Speed Anti-Radiation Missile is to reduce attrition through the destruction and/or suppression of enemy surface to air missile radars. The Tactical Air Armament Study of 1969 described serious deficiencies in the then current Anti-Radiation Missiles (SHRIKE and STANDARD ARM) and recommended development of a new high speed missile. Decision Coordinating Paper-93 of June 1972, authorized development of the High-Speed Anti-Radiation Missile Weapon System and provided the desired performance objectives. The Weapon System development program includes the missile, associated aircraft avionics, launchers and ground support equipment. The High-Speed Anti-Radiation Missile avionics, in conjunction with the aircraft warning equipment, will detect, identify and locate enemy radars, display threat information and pass target parameters to the missile. The missile will have long range, high velocity, quick reaction, a reduced visual smoke rocket motor, capability, and high sensitivity. In addition, it will have broadband frequency coverage in a single seeker and continuous wave capability. Initial deployment of the system will be with the Navy A-7E and Air Force F-4G WILD WEASEL II aircraft. Air Force peculiar development requirements are funded under Air Force Program Element 27162F, Tactical Air-to-Ground Missiles.

(U) RELATED ACTIVITIES: PE 27162F: Develops High Speed Anti-Radiation Missle for use with US Air Force WILD WEASEL II F-4G aircraft. PE 63303N: Anti-Radiation Missile System Technology, provides a technology base for guidance and avionics subsystems for Anti-Radiation Missile weapons systems. PE 64263N: Provides for effort to integrate High Speed Anti-Radiation Missile into F/A-18 aircraft. PE 24134N: Provides for effort to integrate the missile on the A-6E aircraft under Project W1638 beginning in FY 1983.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA (Lead Laboratory). Pacific Missile Test Center, PT Mugu, CA (conduct Navy Technical Evaluation). Contactor: Texas Instruments, Dalias, TX (Weapon System Integrator), Thiokol, Brigham City, UT (Rocket Motor), Motorola, Scottsdale, AZ (Target Detector); ATI, Escondido, CA (Warhead); LTV, Dallas, TX (A-7E Aircraft); McDonnel Douglas, St. Louis, MO (F/A-18 Aircraft), Grumman Aerospace, Bethpage, NY (A-6E Aircraft).

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: W0553: This program was initiated in 1972 and continued in advanced development (PE 63363N, High Speed Anti-Radiation Missile), under Naval Air Systems Command direction, with the main technical effort at the Naval Weapons Center. Texas Instruments was selected as the Weapon System Integraton Contractor in 1974 and is responsible for system integration and development of the guidance, control, wings, fins and peculiar avionics equipment. Government Furnished Equipment includes the rocket motor, warhead, fuze, target detector, launcher and containers. Twenty-five Advanced Development missiles were tested and all test objectives were met. Defense Systems Acquisition Review Council II, held in January 1977, directed the

Program Element: 64360N
DoD Mission Area: 232 - Amphibious, Strike, and Surface Warfare

Title: High Speed Anti-Radiation Missile
Budget Activity: 4 - Tactical Programs

program to remain in Advanced Development to prototype an expanded capability in frequency coverage and maneuverability. This was accomplished and demonstrated. A follow-up Acquisition Review Council was held in February 1978 and the program was directed to proceed into Full Scale Engineering Development. Twenty-seven engineering development (prototype) missiles were delivered for test and evaluation. Expanded frequency capability, improved maneuverability, and a capability on the Navy A-7E and Air Force F-4G aircraft were demonstrated. Awarded contract for forty-five missiles to be used to conduct Navy Technical Evaluation, Navy Operational Evaluation and Air Force Initial Operational Test and Evaluation. Department of the Navy Systems Acquisition Review Council IIb was held on 7 November 1980 and approved authorization to proceed to a low rate initial production of eighty WPN fuzed missiles in fiscal year 1982. Initiated development of a second production source. W1240: Conducted A-6E integration study. Initiate procurement of jettison, separation, captive flight, and guided missiles for the flight test program.

2. (U) FY 1982 Planned Program: W0553: Complete joint Navy and Air Force Operational Evaluation, present test results to Defense System Acquisition Review Council III for authorization to proceed to full rate production. Continue qualification of a second source for production. W1240: Commence development of the aircraft alteration kit (A-K't) and development of required modifications to peculiar avionics (command launch computer and control indicator) to provide compatibility of aircraft and avionics. Deliver flight test hardware. This project has been transferred to PE 24134N Proj. W1638 A-6E Weapons Integration in FY 1983.

3. (U) FY 1983 Planned Program: W0553: Correct any deficiencies found during Operational Evaluation. Full Scale Production of joint Navy and Air Force missiles. W1240: Commence flight test program. This project has been placed under the A-6 Squadrons PE 24134N Proj W1638. Obtain Approval for Service Use.

4. (U) FY 1984 Planned Program: W0553: Full scale production, joint Navy and Air Force procurement. [ ] W1240: Complete flight test program under PE 24134N Proj W1638.

5. (U) Program to Completion: W0553: [ ] Completed. Full Scale Production with competitive procurements. Inventory objective of [ ] aircraft. W1240: Completed. Retrofit of High Speed Anti-Radiation Missile capability in [ ]

Program Element: 64360N
DoD Mission Area: 232 - Amphibious, Strike, and Surface Warfare

Title: High Speed Anti-Radiation Missile
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone		Date
a. Defense Systems Acquisition Review Council I Program Approval		October 1972
b. Management Review - Under Secretary of Defense for Research and Engineering		October 1974
c. Defense Systems Acquisition Review Council II; Release to Engineering Development		February 1978
d. Department of the Navy Systems Acquisiting Review Council IIB; Release to Pilot Production		November 1980
e. Service/Office of the Secretary of Defense Review - Release of funding for interim (concurrent) Production	(September 1981)*	November 1981
f. Complete Navy Operational Evaluation and Air Force Initial Operational Test and Evaluation	(December 1981)*	August 1982
g. Defense Systems Acquisition Review Council III - Release to Full Production	[redacted]	October 1982
[redacted]		
i. Complete A-6E aircraft integration Operational Evaluation		June 1983
j. Approval for Service Use for A-6E integration		August 1983

* Date in parentheses was reflected in FY 1982 Program Element Descriptive Summary.

Program Element: 64360N
DoD Mission Area: 232 - Amphibious, Strike, Anti - Surface Warfare

Title: High Speed Anti-Radiation Missile
Budget Activity: 4 - Tactical Programs

TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation

a. (U) Advanced Development (Government) 1972 - 1974 - the High Speed Anti-Radiation Missile was initiated in 1972 under program management of the Navy Air Systems Command. The initial advanced development effort was conducted at China Lake, CA to determine significant design features and to select alternate missile and avionics component approaches capable of achieving performance objectives. Throughout the Government advanced development period the following hardware was tested to evaluate the missile baseline configuration and validation performance characteristics: Thirteen test missiles, one with a full scale High Speed Anti-Radiation Missile development motor, were launched to gather missile aerodynamic data, validate airframe control and stability and demonstrate guidance performance. Two avionics configurations were evaluated for threat identification, hand-off and reaction time capability. All test objectives were met. Problems noted and corrected are listed below.

Problem	Corrective Action
Reduced roll control subsonic speeds.	Wing deflection limitation at subsonic speeds. Flight tested successfully.
Unacceptable reaction time.	Incorporation of parallel processor.

b. (U) Advanced Development (Contractor) 1974 - 1978. In 1974, Texas Instruments was selected as the Weapon System Integration contractor and was awarded a contract for development of the High Speed Anti-Radiation Missile Weapon System. During this phase of the program, Texas Instruments delivered 16 missiles and 4 avionics units to the government for test and evaluation. The Developmental Test and Evaluation program conducted by the Naval Weapons Center successfully demonstrated missile aerodynamic stability, reduced motor smoke, guidance capability, flex logic operation, avionics hand-off/interface and system reaction time. All advanced development test objectives were met. Problms noted and corrected are listed below.

Problem	Corrective Action
Aerodynamic heating	Use of stainless steel wings and fins vs aluminum.
Increased Missile weight (807 lbs vs 730 lbs)	Weight reduced to cost-effective operationally acceptable level of 780 lbs.
Internal heating limiting	Use of internal head diodes.

[redacted] but refinements of the system are continuing to lessen the effect of these special conditions. Problems noted and corrected are listed below.

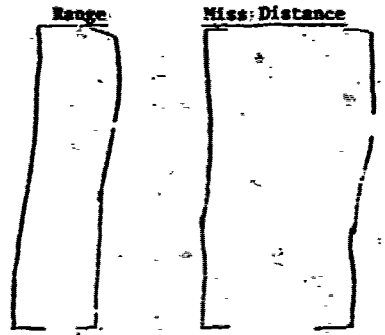
Problem	Corrective Action
Interface with ALR 45F Radar Warning Receiver	Radar Warning Receiver increased memory density and [redacted] performed on High Speed Anti-Radiation Missile side of interface.
Missile Low B nd Performance	Software/Hardware modification.
Memory capacity saturation	Missile memory capacity will be doubled in Pilot Production.
Microwave Circuit Board Producibility	Contractor to review fabrication techniques/increase quality control.
High Frequency Field of View Non-linearity	Improve antenna feedpoints, redesign RF processor.

Summary of Missile Flights

Missile	Configuration	Launch platform	Scenario	Range (NM)	Miss Distance (FT)
MGM 201	Unguided	A-7E	Increased Maneuverability	—	N/A
GM 201	Baseline	F-4G	Hunter Killer	[redacted]	[redacted]
GM 202	Baseline	A-7E	Escort		
GM 206	Baseline	A-7E	Hunter Killer		
GM 203	Baseline	F-4G	Quick Reaction		
MGM 202	Unguided	A-7E	Long range/ high altitude		
GM 216	Baseline	A-7E	War at Sea		

Program Element: 64360M Title: High Speed Anti-Radiation Missile
DoD Mission Area: 232 - Amphibious, Strike, Anti - Surface Warfare Budget Activity: 4 - Tactical Programs

Missile	Configuration	Launch platform	Scenario
GM 207	EXCAP	A-7E	War at Sea/EXCAP
GM 213	EXCAP	A-7E	[redacted]
GM 212	EXCAP	F-4G	Quick Reaction
GM 203	EXCAP	A-7E	Self Protection
GM 210	EXCAP	F-4G	Pre-emptive
GM 215	EXCAP	F-4G	Quick Reaction
GM 217	EXCAP	F-4G	Quick Reaction
GM 214	EXCAP	F-4G	Escort
GM 218	EXCAP	F-4G	Quick Reaction
GM 208	EXCAP	A-7E	Pre-Brief
GM 211	EXCAP	A-7E	Self-Protect



A DNSARC IIB review was held on 7 November 1980 to evaluate test results of prototype missiles prior to commitment of procurement funds for the initial production of 80 missiles with FY 81 funding. The DNSARC review agreed to the initiation of limited production.

Pilot Production Missiles - Forty-five missiles will be utilized for a Navy Technical Evaluation, the Navy Operational Evaluation and the Air Force Initial Operational Test and Evaluation. Navy Technical Evaluation, which began on 4 May 1981 at the Pacific Missile Test Center, will evaluate pilot production missiles, avionics and peculiar ground support equipment to certify readiness of the system to enter operational evaluation. Missile and avionics reliability will be demonstrated and a first article configuration inspection which commenced on 3 August 1981 will validate the contractor's competitive production data package. Pilot production hardware will be representative of production missile configuration fabricated with low rate production tooling and test equipment.

Preliminary information from Navy Technical Evaluation captive-carry flights, reliability testing, environmental testing and five Navy Technical Evaluation live firings conducted to date shows the High Speed Anti-Radiation Missile system has met all performance thresholds. [redacted]

a. (U) High Speed Anti-Radiation Missile Initial Operational Testing began in January 1979 with Commander Operational Test and Evaluation Force monitoring and actively participating in combined Developmental Test/Operational Test-IIA. The Operational Test and Evaluation objectives of phase IIA were to assess the potential operational effectiveness and suitability of High Speed Anti-Radiation Missile through its demonstrated performance in five operational scenarios employing its three modes of operation.

Program Element: 64360N
DoD Mission Area: 232 - Amphibious, Strike, Anti - Surface Warfare

Title: High Speed Anti-Radiation Missile
Budget Activity: 4 - Tactical Programs

Commander Operational Test and Evaluation Force's test agency. VX-5 has flown 19 captive-carry flights and fired four of the prototype guided missiles. All data from developmental and operational testing to date are shared from a common data base. A prototype High Speed Anti-Radiation Missile configured A-7E is used for Navy testing and AFTEC utilizes an F-4G "Wild Weasel" aircraft for Air Force testing. The F-4G has flown 36 captive carry missions and fired eight prototype missiles. Thirteen of the 18 guided missile firings to date have been completed successfully. Four of the five Navy Technical Evaluation firings were completed successfully. All operacional scenarios have been demonstrated and High Speed Anti-Radiation Missiles has been employed in all three modes. An assessment of High Speed Anti-Radiation Missile's potential operational effectiveness and operational suitability was presented at DNSARC IIB on 7 November 1980. The readiness to proceed into initial production was concurred in by the principals and by subsequent OSD review.

b. (U) Twenty of the 45 Research, Development, Test and Evaluation funded pilot production missiles have been delivered. The initial 5 were utilized to conduct Navy Technical Evaluation and 40 will be allocated for the Navy Operational Evaluation and the Air Force Initial Operational Test and Evaluation (Operational Test-IIB). Because the Navy and Air Force will use High Speed Anti-Radiation Missiles on different aircraft with different avionics suites, Operational Test-IIB will be conducted separately, but will be coordinated to eliminate duplication. The joint captive-carry program is planned to demonstrate, at the [ ] confidence level, the captive-carry reliability criteria of [ ] (Air Force only) and that [ ] of the missile will be in an up status following [ ] For Navy Operational Evaluaton and Air Force Initial Operational Test and Evaluation, service currently intends to employ 20 missiles and a minimum of 2 aircraft (Navy A-7Es, Air Force F-4Gs) and each plans to fire 12 missiles. Three of the Navy and one of the Air Force firings will be live warhead shots. Independent assessments will be provided of the operational suitability of High Speed Anti-Radiation Missile and support avionics for DSARC III production suitability of High Speed Anti-Radiation Missile and support avionics for DSARC III production decision. Navy/Air Force squadron personnel will operate and maintain the system. Test ranges at Naval Weapons Center, Pacific Missile Test Center, White Sands, Naval Air Station Fallon, and Nellis Air Force Base will be used.

Type Missiles	Operational Test Summary Number of Missiles
Prototype (Operational Test-IIA)	Four guided missiles firings for Navy and eight for Air Force. Data from Developmental Test and Evaluation will be utilized where possible during Operational Test and Evaluation.

Pilot Production (Operational Test-IIB)	24 missiles firings (12 Operational Evaluation - 12 Air Force Initial Operational Test and Evaluation).
Production (Follow-on Operational Test and Evaluation)	5 Navy and 5 Air Force firings.

c. (U) A second phase Air Force Initial Operational Test and Evaluation/Navy Follow-on Operational Test and Evaluation, to be conducted after the production buy/DSARC III decision, will evaluate a product improvement to increase target specificity (an Air Force requirement). Residual assets from phase I will be used for this testing. The Air Force plans five firings; the Navy plans up to four firings.

d. (U) Follow-on Operational Test and Evaluation may be conducted by Commander Operational Test Evaluation Force with the first block of production missiles and avionics to verify correction of deficiencies, to refine tactical doctrine and evaluate Navy utilitizations of target specificity.

3. (U) System Characteristics

Operational	Milestone IIB Threshold	Milestone III Threshold	Demonstrated
(U) Frequency Coverage (Band)	[ ]	[ ]	[ ]
(U) Speed (Ft/Sec)			
Range (nmi) level launch			
(U) from 5,000' AGL			
(U) 15,000' AGL			
(U) 30,000' AGL			

Program Element: 64360N
DoD Mission Area: 232 - Amphibious, Strike, Anti - Surface Warfare

Title: High Speed Anti-Radiation Missile
Budget Activity: 4 - Tactical Programs

Operational	Milestone IIB Threshold	Milestone III Threshold	Demonstrated
Carriage/Launch Envelope			
(U) Altitude (MSL)	[	[	[
(U) Speed (MACH)			
(U) Pitch (degrees)			
(U) Off-Axis (degrees)	]	]	]
Lethality			
(U) Median CPA (Ft)			
Environments			
(U) ECM	Assess	Assess	Note (1)
(U) Multi-path	Assess	Assess	Note (2)
Reliability (*)			
(U) System	Assess	[	[
(U) Avionics	Assess		
(U) Missile,			
(U) Captive	Assess		
(U) Free Flight	Assess	]	]
(U) BIT			
(U) Avionics	Assess		
(U) Missile	Assess		

Notes: (1) (U) Compatible with EA-6B jammer. [

(2) (U) GM 213 demonstrated acceptable performance

* Performance figures are derived from a limited data base

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FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64361N
Title: NATO SEASPARROW
DoD Mission Area: 231 - Anti-Air 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	3,507	3,467	1,067	0	0	39,304
S0173	SEASPARROW Improvements	3,507	3,467	1,067	0	0	39,304

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the integration of the AIM/RIM-7M monopulse SPARROW Missile into the NATO SEASPARROW Surface Missile System. The missile will have improved performance in the areas of low altitude guidance/fuzing against sea-skimming threats and in the presence of electronic countermeasures. The program also provides for the development of a blast fragmentation missile warhead for use in both the air and surface launched modes, and for improvements to the shipboard system to increase effectiveness in the areas of Electronic Counter-Countermeasures, radar tracking, signal data processing and on-board training.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Operational evaluation testing of the missile (less warhead) and the NATO SEASPARROW system will be completed. Follow-on test and evaluation will be conducted. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT DISCRIPTIVE 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 an increase in FY 1982 of 1,840 as a result of a restructuring of the program (including testing) due to a prior years funding reduction. An increase of 252 in FY 1983 is to cover additional costs in follow-on test and evaluation and to complete the program.

Program Element: 64361N
DoD Mission Area: 231 - Anti-Air Warfare

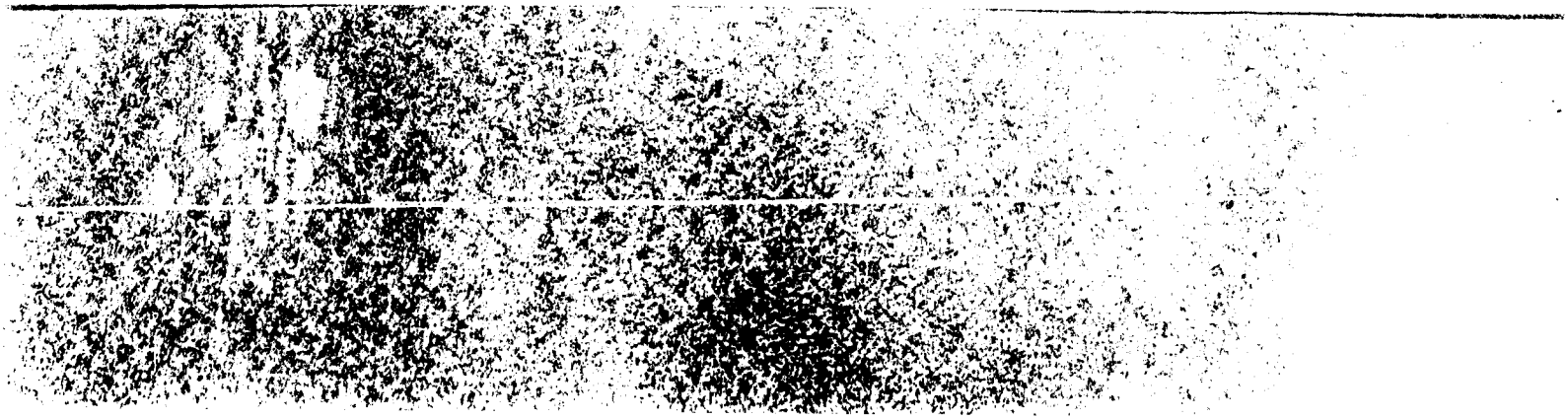
Title: NATO SEASPARROW
Budget Activity: 4 - Tactical Programs

(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	4,191	3,546	1,627	815	-	37,251
S0173	SEASPARROW Improvements	4,191	3,546	1,627	815	-	37,251

(U) OTHER APPROPRIATIONS FUNDS

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
WPN (RIM-7M Missile)	5,100	13,900	64,400	72,900	TBD	TBD
Quantity		(80)	(280)	(385)	TBD	TBD
OPN (RIM-7M NSSMS ORDALT)		13,711	30,786	35,291	50,872	130,660
Quantity		(5)	(12)	(16)	(39)	(72)



Program Element: 64361N
DoD Mission Area: 231 - Anti-Air Warfare

Title: NATO SEASPARROW
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The NATO SEASPARROW Surface Missile System, using the RIM-7H SEASPARROW Missile (modified AIM-7E), was developed to counter the aircraft and anti-ship missile threat of the mid-1970's with capacity to expand to meet the threat of the 1980's. The AIM-7F SPARROW Missile was developed to replace the AIM-7E for air-to-air application, and was scheduled to replace the RIM-7H for NATO SEASPARROW Surface Missile System applications. Although the AIM-7F performance is a marked improvement over the AIM-7E, The SEASPARROW Improvement Program was initiated in FY 1975 to address these deficiencies and develop modification to the AIM-7F in a two-phase program. The first phase (Block I) consisted of and making the changes required for compatibility with surface launch and shipboard environment. With these modifications the NATO SEASPARROW System would partially satisfy Specific Operational Requirement SOR 17-48 Development of the RIM-7F Block I configuration was completed with successful flight testing in December 1977. The Block II phase of the program providing for the development of the RIM-7M version of the missile commenced in June 1978. This development is based upon common air/ surface (AIM/RIM-7M) missile specifications, modifications already developed in the Block I effort plus the addition of a new monopulse seeker. The AIM/RIM-7M configuration will satisfy all requirements of SOR 17-48. The RIM-7M Missile, when integrated with the NATO SEASPARROW System and the Target Acquisition System being developed under Program Element 64362N, will form the U.S. Improved Point Defense Surface Missile System.

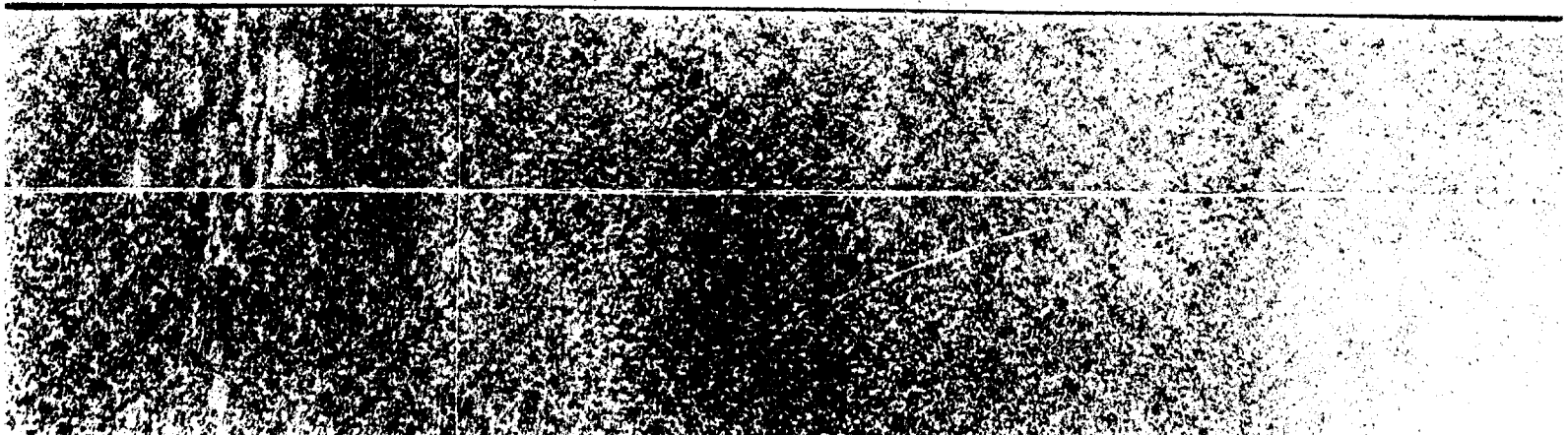
(U) RELATED ACTIVITIES: Program Element 64362N, Point Defense Improvements; Program Element 64305N, Advanced Monopulse Seeker.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Naval Ship Weapons Systems Engineering Station, Port Hueneme, CA; Pacific Missile Test Center, Point Mugu, CA; Fleet Analysis Center, Corona, CA and Naval Surface Weapons Center, Dahlgren, VA. Contractors: Raytheon Company, Lowell, MA; General Dynamics Corp., Pomona, CA; Raytheon Company, Wayland, MA, The Applied Physics Laboratory/John Hopkins University, Laurel, MD; Vitro, Silver Spring, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The production contract for the NATO SEASPARROW Surface Missile Systems was awarded to Raytheon, Wayland, MA. in August 1973. Operational Evaluation, completed in February 1974 using the RIM-7H missile,

The RIM-7F Block I development program was approved in April 1974 and a contract was awarded in March 1975 to the Raytheon Company, Missile Systems Division to develop modifications to the missile guidance and fuzing to improve its performance Concurrently, a contract was awarded to General Dynamics for the design and fabrication of folding wings, clipped fins and a radome for the missile, and for engineering services to monitor and evaluate the Raytheon missile design.



Program Element: 64361N
Title: NATO SEASPARROW
DoD Mission Area: 231 - Anti-Air Warfare
Budget Activity: 4 - Tactical Programs

The development of an active radar fuze was initiated at Naval Weapons Center, China Lake, CA. in FY 1975. Preliminary seeker and missile specifications defining the surface launch monopulse guidance requirements were developed and approved in February 1976. The Raytheon Company, Wayland, MA was awarded a contract to develop the mods to the NATO SEASPARROW Surface Missile System to enable use of the AIM-7F missile variant. Successful Contractor Demonstration Test firings of 7 missiles was completed in September 1976. Development and Operational Testing of RIM-7F Block I missiles was completed in December 1977 with firings of 10 missiles using a modified NATO SEASPARROW Surface Missile System in the USS KANSAS CITY (AOR-3).

Full Scale Engineering Development for the Block II phase of the program was initiated in June 1978 in a joint Naval Air Systems Command/Naval Sea Systems Command program. It provides for the development of the RIM-7M monopulse missile together with a common rocket motor remote/manual arm capability, and for the design and development of an ORDALT kit required in the NATO SEASPARROW Surface Missile System for compatibility with the missile. In addition, development of shipboard system improvements in the areas of radar tracking, Electronic Counter Countermeasures and adaptive signal processing were also initiated. Work was also started on the development of a new blast fragmentation warhead design. The FY 1980 program initiated contractor demonstration firings and the start of Joint Technical Evaluation of the RIM-7M missile and NATO SEASPARROW Surface Missile System modifications. Procurement of 30 prototype blast fragmentation warheads for use in arena and safety tests, and, for use during the joint Technical Evaluation and Operational Evaluation in both air and surface firings.

2. (U) FY 1982 Program: Complete Joint Technical Evaluation and Operational Test and Evaluation. Receive Defense System Acquisition Review Council III Production Decision on RIM-7M. Commence production of the AIM/RIM-7M and ORDALTS. Approval for Service Use for the new Blast Fragmentation Warhead, and plan for production release will be accomplished.

3. (U) FY 1983 Planned Program: Retest and reinstall Signal Data Processor (SDP) aboard test ship for follow on Test and Evaluation Ordnance Alteration (ORDALT) incorporation for Initial Operational Capability (IOC) of March 1983.

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

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

6. (U) Milestones:

Milestone	Date
1. Reorient Program to RIM-7M Missile Development exclusively	January 1978
2. First Deliveries of Test and Evaluation Missiles	April 1980
3. Start Contractor Demonstration Test	April 1980

Program Element: 64361N
DoD Mission Area: 231 - Anti-Air Warfare

Title: NATO SEASPARROW
Budget Activity: 4 - Tactical Programs

4.	Start Joint Technical Evaluation	August 1980
5.	Complete Operational Evaluation (RIM-7M)	(January 1981)*
6.	Production Decision (AIM/RIM-7M)	(January 1981)* August 1981**
7.	Production Contract Award (NATO SEASPARROW ORDALTS)	(February 1981)* October 1981
8.	Initial Production of blast fragmentation warhead	
9.	Initial Operational Capability	

* Date shown in FY 1982 Program Element Descriptive Summary. Changes result from late delivery of prototype missiles developed under Program Element 64305N, Advanced Monopulse Seeker which are to be used in the testing as well as some delay in the testing program caused by late delivery of test missiles.

** Missile production initiated prior to Operational Test and Evaluation (OPEVAL) completion authorized by OSD. New production missiles will be utilized for Operational Test and Evaluation .

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64365N
Title: Standard Missile-2 (N)
DoD Mission Area: 244 - Sea Control Theater Nuclear Warfare
Budget Activity: 4 - Tactical Programs

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

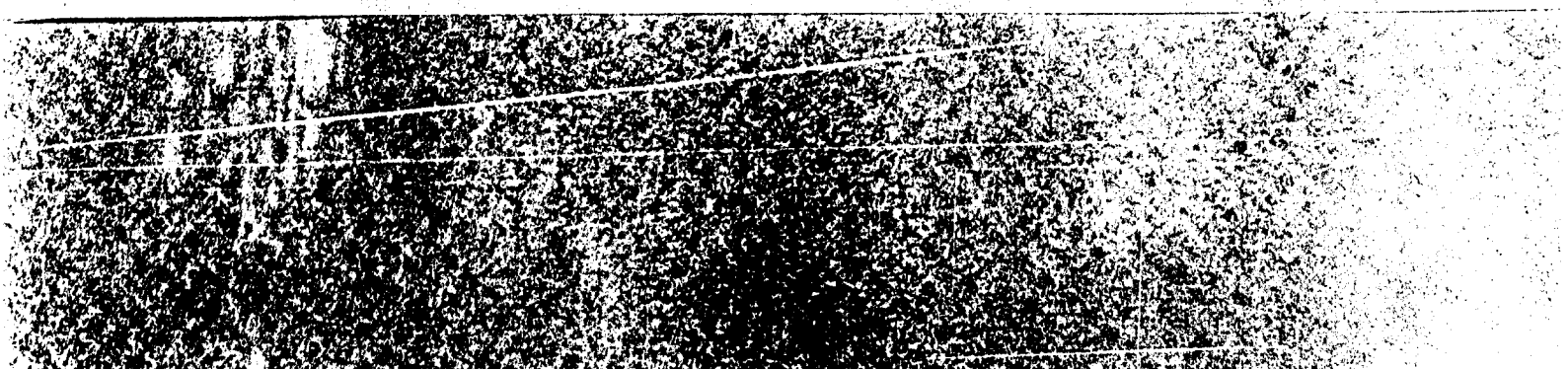
Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENTS	4,000	13,193	18,810	18,763	50,250	121,117
S0175	STANDARD Missile - 2 (N)	4,000	13,193	18,810	18,763	50,250	121,117

(Note: The Department of Energy funds the W81 Nuclear Warhead. Above amounts include DOD (Navy) funds for EX-62 Target Detecting Device (Fuze), STANDARD Missile-2 Flight Test Rounds, integration with shipboard weapon systems, and the Development/Operational Test and Evaluation required to provide a weapon with approval for service use in the Fleet.)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: To provide the STANDARD Missile-2 with nuclear capability specified for the STANDARD/TERRIER System in Specific Operational Requirement 17-09R1 and also for the STANDARD/AEGIS and STANDARD/TARTAR Systems. This Nuclear STANDARD Missile-2 will provide increased capability for the AEGIS and TARTAR Systems and replace the current Beam Riding TERRIER Nuclear Missile. The nuclear capability is intended to improve the effectiveness against targets and provide an assured defensive capability against missiles.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Department of Defense approved continuing the development program in January 1981. FY 1981 funding was included in FY 1981 Budget Supplemental. FY 1982 estimate was included in FY 1982 Amendment. FY 1982 and FY 1983 are based on the rescheduled program. The FY 1981 funds reinitiated the Target Detecting Device development, began missile round procurement for STANDARD missiles for the flight test program, and resumed safety studies and systems analysis studies including battle group anti-air warfare coordination. The FY 1982 and FY 1983 funds will continue the Target Detecting Device development, continue procurement of missiles for the flight test program, and continue nuclear safety studies and battle group anti-air warfare coordination studies. In addition, preparations for shipboard integration will begin. The above funding includes outyear escalation and encompasses all work on development phases now planned or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: Program has been restructured in accordance with current planning and the funding profile has changed for FY 1982 and all subsequent years.



Program Element: 64365N
DoD Mission Area: 244 - Sea Control Theater Nuclear Warfare

Title: Standard Missile-2 (N)
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENTS	50*	4,000	14,000	18,959**	TBD	TBD
S0175-AA	STANDARD Missile Warhead	50*	4,000	14,000	18,959**	TBD	TBD

* All FY 1980 funds deferred by OSD were released 1/3/81, but Congress had recouped all but $50,000.
** Navy Best Estimate - Not OSD approved.

(U) OTHER APPROPRIATIONS FUNDS: WPN funding will be required beginning in FY 1984 for Pilot Production of Fuze Target Detecting Devices (current nomenclature: EX-62 Target Detecting Devices) and long lead time procurement actions for EX-62 production, planned to begin in 3rd/4th Quarter FY 1985. Other items to be included will be: MK 58 Guided Missile Destructor, Warhead Checkout Spacers, Guided Missile Training Round/Training Surface-to-Air Missile Ordnance Alterations Kits, and Command Disablement Controllers.

Program Element: 64365N
DoD Mission Area: 244 - Sea Control Theater Nuclear Warfare

Title: Standard Missile -2 (N)
Budget Activity: 4 - Tactical Programs

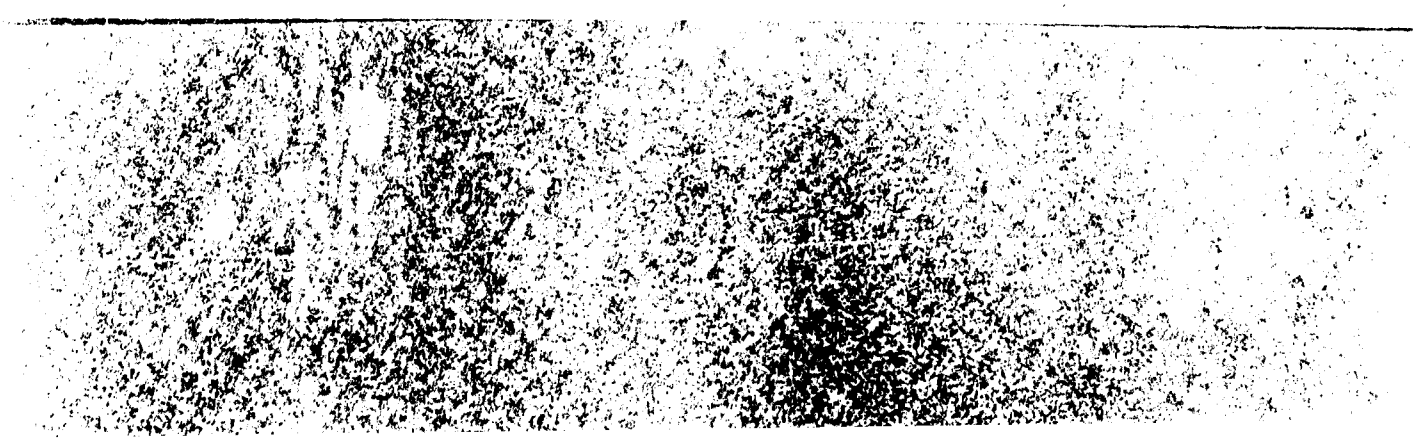
(U) DETAILED BACKGROUND AND DESCRIPTION: A Specified Operational Requirement SOR 17-09RI has been stated for a Nuclear STANDARD Missile-2 Extended Range missile to replace the [TERRIER Nuclear Missile and for a Nuclear STANDARD Missile-2 Medium Range missile to provide a nuclear capability for the AEGIS and TARTAR Systems. In all systems, the nuclear warhead capability is intended to improve effectiveness against [ ]targets, particularly in an electromagnetic countermeasures environment, and provide an assured defensive capability against [ ]missiles. It will provide increased [ ]capability for the AEGIS and TARTAR Systems. This missile will also simplify the TERRIER shipboard fire control configuration by eliminating the beam riding feature maintained solely for the current TERRIER nuclear missile. The approach for the nuclear warhead and fuzing developments will be an integral nuclear ordnance section configured for use with both extended range and medium range versions of the STANDARD Missile, completely alternate and interchangeable with the conventional ordnance section. STANDARD Missile flight test rounds and Target Detecting Devices will be procured to support required development, test and evaluation.

(U) RELATED ACTIVITIES: PE 64303N, AEGIS; PE 64366N, STANDARD Missile Improvement; PE 64352N, Surface-Launched Weapoury, Systems and Technology; PE 64353N, Vertical Launching System; and PE 64372N, New Threat Upgrade. All listed related activities are either STANDARD Missile or systems in which STANDARD Missile is or will be employed.

(U) WORK PERFORMED BY: Naval Surface Weapons Center, White Oak, Silver Spring, MD: Program Technical-Direction Agent and Technical Support Agent, Nuclear; U.S. Naval Weapons Evaluation Facility, Kirkland Air Force Base Albuquerque, NM: Technical Support Agent, Nuclear Safety; General Dynamics, Pomona, CA: Missile Design Agent; RCA, Moorestown, NJ: AEGIS Design Agent; U.S. Naval Weapons Center, China Lake, CA: EX-62 Design Agent; Johns Hopkins University, Applied Physics Laboratory, Laurel, MD: Support Agent, Battle Management and System Analysis; Department of Energy, Sandia National Laboratories, Albuquerque, NM; Nuclear Warhead Section Design Agent; Los Alamos National Scientific Laboratory, Los Alamos, NM; W81 Warhead Design Agent; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA: Technical Support Agent for Integrated Logistic Support, Test and Evaluation, and Missiles; Martin Marietta Corporation, Orlando, FL: Vertical Launching System Design Agent; and seventeen others. Note: Sandia and Los Alamos National Laboratories are funded by DOE.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Department of Energy/Department of Defense Phase I concept and Phase II feasibility studies were complete prior to 1975, and Phase II Engineering Development initiated in 1977. The Project Officers Group (Navy as lead service) was formed and committees charged to perform interfacing. Preliminary drafts of a STANDARD Missile-2 Nuclear System requirements document, a STANDARD Missile-2 Nuclear Missile requirements document, a Safety Plan, and a Test and Evaluation Master Plan were generated. The Department of Energy engineering development effort consists of development of the W81 Nuclear Warhead, weapon electrical system, safety and arming device integrated with the weapon electrical system, case and cabling and warhead section shipping and storage container. The Department of Defense (Navy) engineering development effort consists of development



of the FX-62 Fuze Target Detecting Device with associated antennas and the MK 58 Guided Missile Destructor, along with missile and shipboard integration. The program was not funded in FY 1980. In FY 1981, the program was reinstated by OSD, and restuctured in schedule and funding profile. Under the restructured program the Project Officers Group will continue to oversee and manage the coordination of interfaces between functional and hardware responsibilities. The development of the EX-62 target detecting device and the MK 58 Guided Missile Destructor were resumed by the Naval Weapons Center, in close collaboration with the Sandia National Laboratory, Albuquerque, and the Los Alamos National Laboratory. Procurement actions were initiated to procure STANDARD Missile flight test rounds to support the target detecting device and Guided Missile Destructor developments and to introduce private industry into these development projects.

2. (U) FY 1982 Program: In FY 1982 the above work will continue. In addition, joint tests of the W81 Warhead Test Assemblies (non-nuclear) and the EX-62 Target Detecting Device Engineering Development Models will be conducted by the Naval Weapons Center, China Lake and Sandia National Laboratory, Albuquerque.

3. (U) FY 1983 Planned Program: Joint testing of W81 Warhead Test Assemblies and EX-62 Prototype Models will be conducted. STANDARD Missile-2 Flight Test Rounds will be fabricated. Planning and preparations for Navy Technical Evaluation flight tests at White Sands Missile Range will begin. Captive flight tests of the EX-62 will be conducted.

4. (U) FY 1984 Planned Program: In FY 1984 the Navy Technical Evaluation at the White Sands Missile Range will be initiated. SM-2(N) Extended Range Missile Rounds will be tested in the first phase of the TECHEVAL.

5. (U) Program to Completion: Planning and preparations for Navy Fleet Operational Test and Evaluation will be initiated. In FY 1985 Navy Follow-on Operational Test and Evaluation will be conducted aboard a TERRIER ship. The EX-62 Target Detecting Device and MK 58 Guided Missile Destructor will begin quantity production.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64366N
Title: STANDARD Missile Improvements
DoD Mission Area: 231 - Anti-Air 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	64,618	50,592	50,789	62,391	Continuing	Continuing
S0176	STANDARD Missile-2 Testing	23,719	24,221	15,870	17,965	Continuing	Continuing
S0189	STANDARD Missile-2 Improvements	25,071	11,336	8,128	7,575	6,302	133,417
S0439	STANDARD Missile-1 Improvements	15,828	15,035	10,308	9,263	12,449	96,020
S1632	STANDARD Missile-3	0	0	16,483	27,588	TBD	TBD

Program costs include test missile procurement. To date, 23 Flight Test Rounds in Project S0189, 59 Flight Test Rounds in Project S0176, and 3 Flight Rounds in Project S0439.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Missiles of the STANDARD Missile family are the primary surface-to-air missiles employed in AEGIS, TARTAR and TERRIER weapon systems. STANDARD missiles are operational in some (60) ships and are programmed for over 100 ships through the 1980's. This program element upgrades STANDARD Missile 2 (Block II) to substantially increase kinematics, ordnance, and electronic counter-countermeasures performance to make it more effective against projected high altitude, high velocity anti-ship missile targets. The Program Element also provides missiles and support for test with new systems such as Vertical Launch, AEGIS CG 47, TERRIER/TARTAR New Threat Upgrade Systems, and for development and operational test of missile improvements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0189: Complete fabrication and 7 Development Tests of SM-2 Block II Extended Range missiles At-Sea, 3 Development Tests of SM-2 Block II Medium Range missiles at White Sands Missile Range and 4 Development Tests at-sea. Project S0176 Complete fabrication and 7 OPEVAL Tests of SM-2 Block II Extended Range missile At-Sea and 10 OPEVAL Tests of SM-2 Block II Medium Range At-Sea. Complete fabrication and initiate flight test of 3 TARTAR Block I Medium Range missiles and 24 AEGIS SM-2 Block I Medium Range missiles in CG-47. Project S0439: Continue development of the SM-2 Block II Medium Range missile propulsion and airframe. Continue fabrication of 3 SM-2 Block II Medium Range TARTAR missiles for flight test in FY 84. As this is a continuing program, the above funding includes out year escalation and encompasses all work or development phases now planned thru FY 1984 only. Project S1632: Complete tade-off studies to determine the Navy's next generation surface launched Anti-Air Warfare missile to meet the increasingly difficult targets projected for the 1990's. Begin Full Scale Engineering Development.

Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile Improvements
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 are as follows: FY 1981, an increase of 1,695 in Project S0176 to provide for increased testing costs, and a decrease of 236 in Project S0189 and 198 in Project S0439 for inflation adjustment; FY 1982, reductions of 363, 206 and 835 in Projects S0176, S0189 and S0439 respectively due to minor program adjustments and escalation reductions; FY 1983, a reduction of 1,282 in Project S0189 and 321 in Project S0439 and 2,758 in Project S0176 due to a minor restructuring and escalation reductions. Project S1632, SM-3 is a new start which increases the FY 1983 funding 16,483. Project S0176 has been left open (continuing) for procurement of future test missiles, not yet defined, which will be required for the SM-3 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	77,163	63,357	51,996	38,667	88,984	383,351
S0176	STANDARD Missile-2 Testing	30,305	22,024	24,584	18,628	52,978	148,519
S0189	STANDARD Missile-2 Improvements	24,962	25,307	11,542	9,410	15,648	136,812
S0439	STANDARD Missile-1 Improvements	21,896	16,026	15,870	10,629	20,358	98,020

(U) OTHER APPROPRIATION FUNDS:

WPN SM-2 Procurement	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
STANDARD Missile-2 Extended Range, Block II, Pilot Line and Production*	0	36,100	291,400	325,100	TBD	TBD
Quantity		35	375	450		
STANDARD Missile-2 Medium Range, Block II, Pilot Line and Production*	0	0	38,100	194,700	TBD	TBD
Quantity			30	300		

* 1st year Pilot Line, Following Years Production

: 64366N
: 231 - Anti-Air Warfare

Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

ED BACKGROUND AND DESCRIPTION: STANDARD Missile-1 Block V is operational. STANDARD Missile-1 Block VI incorporating the STANDARD Missile-2 Block I monopulse seeker, began replacing Block V in production in FY 1980. The STANDARD Missile-2 Block I development was initiated in FY 1972 incorporating midcourse guidance and a monopulse seeker. Midcourse guidance missiles are required for the AEGIS Weapon System and advanced TERRIER and TARTAR Weapon Systems. STANDARD Missile-2 Block I Extended Range is presently in production with first deployment in USS MAHAN in FY 1979. Production of STANDARD Missile-2 Block I Medium Range was initiated in FY 1980 for application in AEGIS CG 47 class cruisers and TARTAR CGN and DDG 993 classes. In 1975, the Secretary of Defense identified the [Missiles and associated electronic countermeasures as the most stringent threat to the Navy and directed development of a higher speed version; STANDARD Missle 2 Block II Extended Range (SM-2 Block II ER). Subsequently, development of STANDARD Missile-2 Block II Medium Range for AEGIS and TARTAR ships was authorized. Technical definition prescribed: (1) propulsion improvements to increase total impulse [ ] (2) ordnance developments to cope with the higher closing velocities and variable intercept geometries of [ ] intercepts; (3) autopilot modifications to permit larger angles of attack [ ] and (4) reduced acquisition and tracking band-width in the homing receiver to reduce susceptability to stand-off jamming. Project SO189, STANDARD Missile 2 Improvements, develops the required narrow band homing receiver, autopilot, ordnance package and the Extended Range booster for the STANDARD Missile-2 Block II missile. Project SO439, STANDARD Missile-1 Improvements, develops the Dual Thrust Rocket Motor, airframe, and control for STANDARD Missile-2 Medium Range Block II. The Block II Medium Range missile will be capable of launch from conventional or vertical launchers. The STANDARD Missile-2 Extended Range Block II prime contract was awarded in May 1977. STANDARD Missile-2 Medium Range Block II was incorporated in Jul; 1978. Project SO176, SM-2 testing was directed by Congress to provide SM-2 Block I and Block II missiles for test with new combat weapons systems associated with CG 47 and Vertical Launch systems

(U) RELATED ACTIVITIES: Program Element 64303N, AEGIS (AEGIS Weapon System employing New Threat Upgrade and STANDARD Missile-2 Blocks I and II Medium Range); Program Element 64352N, Surface Launched Weaponry (TERRIER and TARTAR Weapons System employing STANDARD Missile-1 and STANDARD Missile-2 Block II Extended Range in CGN and Medium Range CG/New Threat Upgrade Systems); Program Element 64365N, STANDARD Missile Warhead Development (providing nuclear warhead development for anti-air missiles); Program Element 64368N, Vertical Launch System (utilized in AEGIS ships for increased system capability). Program Element 64373N (TARTAR CGN New Threat Upgrade employing SM-2 Block II Medium Range Missiles).

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Naval Surface Weapons Center, Dahlgren, VA; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Naval Ordnance Station, Indian Head, MD. Prime Contractor: General Dynamics, Pomona, CA.

Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0189: The SM-2 Block II Extended Range missile design is essentially complete. The booster rocket motor has been fully qualified. Engineering Design Model guidance section, target detecting device, warhead, and autopilot section have been qualified. Three Launch Test Vehicles, 2 Propulsion Test Vehicles, and 2 Control Test Vehicles have been successfully flight tested. Flight Test Rounds 16 Extended Range and 7 Medium Range are completing fabrication with first flight test scheduled in early FY 1982. Project S0176: Two SM-2 Block I Modified Vertical Launch Flight Test Rounds have been successfully flight tested at White Sand Missile Range and 8 Flight Test Rounds have completed fabrication for flight test at-sea in early FY 1982. Some 47 Block I and II Flight Test Rounds are in fabrication for test in TERRIER, AEGIS, and TARTAR systems. Project S0439: The dual thrust rocket motor has completed a number of development test static firings and has entered Pre-Flight Readiness Testing. Three Propulsion Test Vehicles and 4 Control Test Vehicles are completing fabrication for flight test in FY 1982.

2. (U) FY 1982 Program: Completion of the following SM-2 missile fabrications for flight tests:

Project	Missile Type	Units	Test Phase
S0189	Block II Extended Range	6	Development, White Sands Missile Range
	Block II Extended Range	10	Development, DDG 42
S0176	Block II Extended Range	10	OPEVAL, DDG 42
	Block I Medium Range (AEGIS Vertical Launch)	8	System Level, USS NORTON SOUND
S0439	Block II Medium Range (Propulsion Test Vehicles)	3	Development, White Sands Missile Range
	Block II Medium Range (Control Test Vehicles)	4	Development, White Sands Missile Range

Analysis and evaluation of test results will be conducted. Design refinements will be defined as required based on flight test results. New Focused Blast Fragmentation Warhead will be incorporated in several missiles for testing. The basic Block II Extended Range Level 3 data package will be completed and delivered to initiate pilot production in FY 1982. Initial investigations of follow-on missile requirements will be conducted.

3. (U) FY 1983 Planned Program: Completion of the following SM-2 missile fabrications and flight tests will be conducted.

Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

Project	Missile Type	Units	Test Phase
S0189	Block II Extended Range (AEGIS)	3	Development, White Sands Missile Range
	Block II Extended Range (AEGIS)	4	Development, USS NORTON SOUND
S0176	Block I Medium Range (TARTAR)	3	Production, White Sands Missile Range
	Block II Medium Range (AEGIS)	24	Follow-on, CG 47
	Block I Medium Range (AEGIS)	10	OPEVAL, USS NORTON SOUND
S0439	Continue fabrication of 3 SM-2 Block II Medium Range TARTAR		

Analysis and evaluation of test results will be conducted. Design refinements will be defined as required based on flight test results. The basic Block II Medium Range AEGIS Level 3 data Package will be completed and delivered initiating pilot production in FY 1983. Definition of follow-on missile requirements will continue. Complete assessment of requirements for the Navy's next generation surface-to-air missile. Receive approval to begin engineering development of SM-3 which will be needed to counter even higher speed, higher altitude, [Soviet anti-ship missiles in increasingly severe stand-off jamming environments of the 1990's and beyond.

4. (U) FY 1984 Planned Program: Flight testing of the above missiles will continue. Conduct shipboard hazzards and safety qualification tests, electromagnetic compatability environmental tests in different ship classes. Continue definition and introduction of design refinements required as a result of test and evaluation. Approval for Service Use of the Medium Range Missile will be obtained. Continue integration of the SM-2 Block II ER missile with the CG16/CG26 DDG-993, and CGN 36/38 Class ship combat systems. Three SM-2 Block II Medium Range TARTAR rounds will be completed and flight tested at White Sands Missile Range . Follow-on Test and Evaluation will begin on the SM-2 Block II. Continue Full Scale Engineering Development on the next generation surface-to-air missile (SM-3) which will be needed to counter ever increasing Soviet threat.

5. (U) Program to Completion: Operational and follow-on testing of new systems. Design modifications based on flight test results will be incorporated and integration with ship weapons systems completed. Test and Evaluation will be conducted. Analysis of missile system performance characteristics will continue to be explored for tactical use. New technology will be explored for possible performance improvements. Continue development of the next generation missile (SM-3).

Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

6. (U) Milestones (S0189 & S0439):

Milestones		Date
1. Secretary of Defense Direction		AUGUST 1976
2. Prime Contract Award - STANDARD Missile-2 Block II		MARCH 1977
3. STANDARD Missile-2 Block II Preliminary Design Review		MAY 1978
4. Prime Contract Award - STANDARD Missile-1 Improvement		APRIL 1978
5. STANDARD Missile-1 Improvements Preliminary Design Review		NOVEMBER 1978
6. STANDARD Missile-2 Block II Critical Design Review		MAY 1980
7. STANDARD Missile-2 Block II Extended Range, Flight Tests at White Sands Missile Range (6)	(OCTOBER 1981)	FEBRUARY 1982
8. STANDARD Missile-2 Block II Extended Range, Pilot Production (35)	(OCTOBER 1981)*	JANUARY 1982
9. STANDARD Missile-2 Block II Extended Range, Flight Tests At-Sea (6) (PHASE I)	(APRIL 1982)*	JUNE 1982
10. STANDARD Missile-1 Block II Medium Range, Flight Tests at White Sands Missile Range (3)	(DECEMBER 1982)*	FEBRUARY 1983
11. STANDARD Missile-2 Block II Medium Range, AEGIS, Flight Tests At-Sea (4)	(APRIL 1983)*	OCTOBER 1983
12. STANDARD Missile-2 Production Reliability Design Review		SEPTEMBER 1981
13. STANDARD Missile-2 Block II Extended Range Flight Tests At-Sea (14) (PHASE-II)	(AUGUST 1982)*	MARCH 1983
14. STANDARD Missile-2 Block II Production Decision/Approval For Service Use, Extended Range	(SEPTEMBER 1982)*	MAY 1983
15. STANDARD Missile-2 Block II Production Decision/Approval For Service Use, AEGIS	(MAY 1983)*	NOVEMBER 1983
16. STANDARD Missile Block II Medium Range, TARTAR, Flight Tests at-Sea (3)		FEBRUARY 1984
17. STANDARD Missile-2 Block II Production Decision/Approval For Service Use, TARTAR Medium Range		APRIL 1984

* Date listed in FY 1982 Program Element Descriptive Summary

NOTE: Explanation of 6 months or more changes:

* Items 11 and 15. Due to delay in Medium Range propulsion development.
* Items 13 and 14. Due to delay of delivery of flight test rounds.

Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

7. (U) Test and Evaluation Data: Refer to Test and Evaluation summary sheets under Project S0189, STANDARD Missile-2 Improvements.

Project: S0176
Program Element: 64366N
DoD Mission Area: 231-Anti-Air Warfare

Title: SM-2 Testing
Title: STANDARD Missile Improvements
Budget Activity: 4-Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION. Several programs require STANDARD Missile-2 missiles for developmental, integration, and operational testing. This project was created in response to Congressional and Navy concerns that missiles and support for system testing be given greater visibility. Programs which will be provided missile rounds from this project include: Vertical Launch System, CG 47 introduction, and follow-on testing of new AEGIS, TERRIER and TARTAR ships employing STANDARD Missile-2 Block I and/or Block II. The Project is to provide missile hardware and associated support. OPTEVFOR does not recognize the Project for separate T&E monitoring.

(U) RELATED ACTIVITIES: Program Element 64303N, (AEGIS Weapon System employing STANDARD Missile-1 and -2 Medium Range), Program Element 64352N, Surface Launched Weaponry (TERRIER and TARTAR Weapon Systems employing STANDARD Missiles-1 and -2 Block II Extended Range in CGN and CG/New Threat Upgrade System), Program Element 64365N, Surface Missile Warhead Development (providing nuclear warhead development for anti-air missiles, if required), Program Element 64368N, Vertical Launch System (utilized in AEGIS ships for increased firepower). Program Element 64377N (SM-3 Missile Development).

(U) WORK PERFORMED BY: In-House: Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA. Contractor: General Dynamics, Pomona, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The project has provided: Two SM-2 Block I FY 1979 Production Surveillance Rounds and 10 Block I Special Vertical Launch test rounds. Test support has been provided for flight test and Electromagnetic Environmental Effects testing of FY 1979 Production Surveillance Rounds and flight test of 2 Vertical Launch test rounds. Fourty-seven additional test rounds are in fabrication.

2. (U) FY 1982 Program: Complete flight test of 8 Block I Vertical Launch test rounds. Complete fabrication and flight test of 3 SM-2 Block II Extended Range TERRIER OPEVAL rounds. Continue fabrication of 42 flight test rounds.

3. (U) FY 1983 Planned Program: Complete fabrication of: 3 SM-2 Block I Medium Range TARTAR Flight Test Rounds, 24 SM-2 Block I Medium Range AEGIS rounds (introductory testing in AEGIS lead ship, CG-47), 7 SM-2 Block II Extended Range TERRIER OPEVAL rounds, and 10 SM-2 Block II Medium Range AEGIS OPEVAL rounds. Support flight test preparations. Complete at least 50 percent of flight tests. Perform flight tests to complement flight test and complete engineering design evaluation of the rounds. Prepare or modify Inert Operational Missiles, Blast Test Vehicles, and program test van to support ground integration and testing and flight testing.

Project: S0176 — Title: SM-2 Testing
Program Element: 64366N — Title: STANDARD Missile Improvements
DoD Mission Area: 231-Anti-Air Warfare — Budget Activity: 4-Tactical Programs

4. (U) FY 1984 Planned Program: Complete flight testing of rounds noted under FY 1983 Program. In addition, complete and flight test 3 SM-2 Block II Medium Range TARTAR Flight Test Rounds. Modify as required instruments, such as the Inert Operational Missile, to support flight and special ground tests. Complete round engineering design evaluation as a result of ground and flight tests. Prepare for and conduct integration testing for introduction of the SM-2 missile in all designated TERRIER AEGIS and TARTAR ships. Testing will cover launcher and data link tests, booster and dual thrust rocket motor shipboard safety and hazards qualifications tests, electromagnetic compatibility tests, and near miss shock tests.

5. (U) Program to Completion: Project continuing. Continue testing and support for SM-2 introduction in TERRIER, AEGIS, and TARTAR ships. Continue Electromagnetic Pulse testing. Fabricate follow-on test missiles, conduct at-sea TECHEVAL/OPEVAL testing, and introduction in AEGIS and DDGX 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
S0176	STANDARD Missile-2 Testing	23,719	24,221	15,870	17,965	Continuing	Continuing

Project: S0189 Title: SM-2 Improvements
Program Element: 64366N Title: STANDARD Missile Improvements
DoD Mission Area: 231 - Anti-Air Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Secretary of Defense has identified the

Area Anti-Air Warfare missiles are required with substantially increased velocity, altitude and maneuvering capability, decreased homing band width, and higher ordnance effectiveness at high closing rates. Modification of STANDARD Missile-2 (designated Block II) was determined to be the best alternative to meet the requirements in the near-term. Booster propulsion of the Extended Range missile is increased by use of an advanced propellant. Dual thrust rocket motor propulsion of the Medium Range missile is increased by a new propellant and motor extension developed under Project S0439. Velocity of the missile is increased and maximum altitude extended The control system is modified to utilize the increased velocity and higher angle of attack. These changes provide:

Stringent requirements on the warhead are imposed by higher closing velocities and increased angles of attack.

The present STANDARD Missile-2 fuze is modified/

Modifications are also necessary to increase thermal and vibration tolerance as a result of higher velocity. Development of an improved STANDARD Missile-2 Extended Range missile based on the above elements was directed by Secretary of Defense in August 1976. These improvements, except booster propulsion, were determined to be applicable to the STANDARD Missile-2 Medium Range missile, and the Medium Range Missile was included in the development. The development of an improved Dual Thrust Rocket Motor for STANDARD Missile-2 Medium Range is allocated to Project S0439. Vertical Launch Capability is incorporated in the Medium Range design. Twenty-three flight test rounds are in fabrication for land-based and at-sea Development Testing. High commonality is maintained between the Extended Range and Medium Range missiles and support systems.

(U) RELATED ACTIVITIES: Program Element 64303N, AEGIS (AEGIS Weapon System employing STANDARD Missile-1 and STANDARD Missile-2 Blocks I and II Medium Range), Program Element 64372N, New Threat Upgrade (TERRIER Weapon System employing STANDARD Missile-1 and STANDARD Missile-2 Block II Extended Range in CG/New Threat Upgrade System), Program Element 64368N, Vertical Launch System Program (utilized in AEGIS ships for increased firepower); and Program Element 64365N, Surface Missile Warhead Developent (providing nuclear warhead development for anti-air missiles).

Project: S0189
Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: SM-2 Improvements
Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA; Naval Ordnance Station, Indian Head, MD; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA. Prime Contractor: General Dynamics, Pomona, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Prime Contract was awarded to General Dynamics Pomona Division in May 1977 and modified to include the Medium Range missile in June 1978. Rocket motors are developed under subcontract by the prime contractor. Preliminary Design Review was completed on the missile round in May 1978. Critical Design Review of the Extended Range missile was completed in May 1980. The basic missile design is complete through flight hardware. The booster rocket motor is fully qualified. Engineering Design Models of guidance and control sections, target detecting device and warhead have been fully qualified. Two of two Propulsion Test Vehicles and two of two Control Test Vehicles have been flight tested very successfully. Components and sections for Flight Test Rounds are in fabrication for all 23 rounds. Two missiles are at round level test in preparation for early FY 1982 flight test.

2. (U) FY 1982 Program: SM-2 Block II Extended Range flight tests will be conducted: 5 Developments Tests at WSMR and 3 Phase I, At-Sea, Development Tests in USS MAHAN. Evaluation of results will be conducted and design refinements defined as required. The basic SM-2 Block II Extended Range Level 3 data package will be delivered. Fabrication of 7 Medium Range flight test rounds will continue. Initial investigations of follow-on missile requirements will be conducted.

Fabrication will continue on 7 SM-2 Block II Extended Range missile for Development Test At-Sea in FY 84.

3. (U) FY 1983 Planned Program: SM-2 Block II Extended Range Missile, Phase II flight tests will be conducted At-Sea in USS MAHAN (7 Development Tests). SM-2 Block II AEGIS, Medium Range flight tests will be conducted: 3 Development Tests at WSMR, 4 Development Tests At-Sea. The basic SM-2 Block II Medium Range Level 3 data package will be delivered. Analysis and tests will be conducted to characterize ordnance effectiveness and possible improvements for high speed crossing encounters. Conversion of Warhead Compatable Telemetry and Low Side Lobe Antenna to production designs will be initiated. Greater effort will be placed on definition of operational performance in TERRIER, AEGIS, Vertical Launch and TARTAR systems.

Project: S0189 Title: SM-2 Improvements
Program Element: 64360N Title: STANDARD Missile Improvements
DoD Mission Area: 231 - Anti-Air Warfare Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Final analysis of the flight test datta will be completed and data packa[illegible]y design modifications defined. Effort will continue on ordnance effectiveness, completion of telemetry and low [illegible]be antenna production design, and oper[illegible]ional performance definition. Investigation of follow-on missile requirements wil[illegible]nue.

5. (U) Program to Completion: The SM-2 Block II production des[illegible]gn and feasible improv[illegible]ements will be finalized and incorporated in major production.

6. (U) Milestones:

Milestones		Date
1. Secretary of Defense Direction		AUG 1976
2. Prime Contract - STANDARD Missile-2 Block II		MAY 1977
3. Booster Subcontract		DEC 1977
4. Preliminary Design Review		DEC 1977
5. Critical Design Review		MAY 1980
6. Booster Propulsion Test Vehicle Flight Test		FEB 1980
7. Control Test Vehicle Flight Test (2 Extended Range)		OCT 1980
8. Preproduction Reliability Design Review		SEP 1981
9. Flight Test Round, Flight Test White Sands Missile Range, 5 Extended Range Missiles	(SEP 1981)*	MAR 1982
10. Limited Pilot Production Decision, 35 Extended Range Missiles	(Oct 1981)	FEB 1982
11. Flight Test Round, Flight Test At-Sea, Phase I, 6 Extended Range Missile	(APR 1982)	AUG 1982
12. Flight Test Round, Flight Test At-Sea, Phase II, 14 Extended Range Missile	(AUG 1982)*	MAR 1982
13. Approval for Service Use, Extended Range Missile	(Nov 1982)*	MAY 1983
14. Flight Test Round, Flight Test White Sands Missile Range, 3 Medium Range Missiles	(APR 1982)*	NOV 1982
15. Flight Test Round, Flight Test At-Sea, 14 Medium Range	(SEP 1982)*	OCT 1983
16. Approval for Service Use, Medium Range Missile	(MAY 1983)*	DEC 1983

( ) Milestones shown in FY 82 PED
* Milestone deviations greater than 6 months:
Items 9, 12 & 13: Delays due to slip in delivery of Extended Range Missile, Flight Test Rounds.

Project: S0189 Title: SM-2 Improvements
Program Element: 64366N Title: STANDARD Missile Improvements
DoD Mission Area: 231 - Anti-Air Warfare Budget Activity: 4 - Tactical Programs

Item 11: April date is in error. April was a first delivery not a completion of flight date. However, 20 rounds were to be fired at-sea by Aug 1982. ue to late delivery of rounds and lack of threat representative target, firings have been rescheduled in 2 Phases. One completes in Aug 1982 with existing targets and the other Mar 1983 with improved targets.

Irems 14, 15, 16: Medium Range Flight Test Rounds are delayed by six months to one year by extension of the development of the EX 104 rocket motor.

7. (U) Resources: (Dollars in Millions)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0189	STANDARD Missile-2 Improvements	25,071	11,336	8,128	7,575	6,302	133,417

Project: S0189
Program Element: 64366N
DoD Mission Area: 231-Anti-Air Warfare

Title: STANDARD Missile-2 Improvements
Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA

1. (U) Background: The prime contractors, General Dynamics, Pomona Division, is responsible for design and development of missile guidance, control, propulsion, and airframe. They are round design agent responsible for total round integration and development testing. General Dynamics subcontracts for booster rocket motor and dual thrust rocket motor development. Ordnance is a joint development by Naval Surface Warfare Center, (warhead), and Naval Weapons Center, (target detecting device). Development of the Medium Range missile dual thrust rocket motor, control system, and airframe is under Project S0439, STANDARD Missile 1 Improvements. Development was initiated in FY 77 with Approval for Service Use planned for the Extended Range missile in mid FY 83 and for the Medium Range missile in early FY 84.

2. (U) Development Test and Evaluation

a. (U) Booster Rocket Motor Verification: To Date: Fifty-nine static firings have been conducted from development into qualification tests. Seven boosters have been flight tested in ballistic, propulsion control test vehicles and flight test rounds. Propellant formulation and curing times are firm. Twenty-eight static firings were conducted to complete Qualification Tests. Motors are prepared and in storage for flight test rounds. Program is ready for initial production.

b. (U) Dual Thrust Rocket Motor Verification: (Described under this Program Element, Project S0439, STANDARD Missile 1 Improvements).

c. (U) Radome Environmental Vertification: To-Date: Thermal shock, structural integrity, and rain effects have been evaluated in sled tests and propulsion and control vehicle flight test. Performance has been satisfactory. Planned: No further tests planned.

d. (U) Control/Aerodynamics: To Date: Wind tunnel tests have verified analytical parameters and narrowed tolerance of uncertainty for both the Extended Range and Medium Range missiles. Flight test of two propulsion test vehicles, two control test vehicles and two flight test rounds have provided excellent verification of missile aerodynamics, stability and control, and high altitude performance. Planned: Conduct 23 Extended Range and 17 Medium Range full up missile flight tests.

e. (U) Ordnance: To Date: Warhead and fuze have completed Engineering Design, qualification tests of contractor prototypes are in process. Warhead and fuzes have been delivered for first five flight test rounds. Two fuzes were flown in Flight Test Rounds. Both missiles were direct hits. In the first flight there was an anomaly in fuze performance. Cause was determined. In the second test, fuze performance was excellent. Planned: Complete warhead fuze contractor qualification. Complete tests in Flight Test Rounds.

Project: S0189
Program Element: 64366N
DoD Mission Area: 231-Anti-Air Warfare

Title: STANDARD Missile-2 Improvements
Title: STANDARD Missile Improvements
Budget Activity: 4 - Tactical Programs

f. (U) Terminal Guidance: To Date: Laboratory tests have been completed on the seeker by the contractor up thru first five flight round configuration. Independent tests at the Applied Physics Laboratory also show excellent performance; test on latest configuration is in progress. Results to date show excellent conformance with requirements. Two flight tests have been completed. Both were direct hits.

g. (U) Flight Test Rounds, Full-up Missile Firing Plans

(1) (U) Five Extended Range are scheduled Dec 1981 thru Mar 1982 at White Sands Missile Range. The objective is to verify flight environment effects, capability to intercept within envelope against Electronic Countermeasures, performance of ordnance, and missile reliability. Two flights were conducted near maximum range, against a self-screening jammer and against a crossing target. Both tests were direct hits.

(2) (U) Ten Extended Range Flight Test Round firings are scheduled at-sea in CG/New-Threat-Upgrade ship, June 1983. Verify missile-system compatibility. Demonstrate increased intercept performance. Demonstrate Electronic Countermeasures performance. Demonstrate ordnance effectiveness. Assess reliability. Determine readiness for Operational Evaluation.

(3) (U) Three Medium Range Flight Test Round firings at White Sands Missile Range early Jan-Feb 1983. Same objectives as 2.g.(1).

(4) (U) Four Medium Range Flight Test Round firings are planned at-sea in AEGIS/Vertical launch configured ship April-June 1983. Same objectives as 2.g.(2). In addition, verify missile capability launched from Vertical Launcher.

3. (U) Operational Test and Evaluation

a. (U) To Date: Many functional missile and system interfaces and components are common with STANDARD Missile 2 Block I ship interfaces and components. They were previously verified under the Block I program Operational Testing.

b. (U) Planned

(1) (U) Ten Extended Range Flight Test Round firings are planned at-sea in USS MAHAN. June thru February 1982. Assess operational effectiveness and suitability of the STANDARD Missile 2 Block II missile. Program is described in TEMP 623. General objectives are: compatibility with the New Threat Upgrade Combat System and Guided Missile Launcher MK 10; suitability in handling and transportation, and assess flight reliability.

(2) (U) Ten Medium Range Flight Test Round firings are scheduled at-sea in AEGIS/Vertical Launch configured ship. [ ] Same objectives as 3.b.(1). In addition, operability in conjunction with Vertical Launch will be assessed.

4. (U) System Characteristics (Threshold)

a. (U) Parameters	Objectives: Medium Range	Objectives: Extended Range
(1) Maximum Range	[ ]	[ ]
(2) Maximum Altitude		
(3) Minimum Range		
(4) Miss Distance		
(5) Probability		
(6) Booster Impulse		
(7) Dual Thrust Rocket Motor Impulse		
(8) Guidance Bandwidth		
(9) Fragmen Velocity		
(10) Maximum Kinematic Range (not a requirement)		

b. (U) Verification

All laboratory and limited configuration, missile flight tests to date have demonstrated the capability to meet the above parameters. Propulsion Test Vehicles and Control Test Vehicles, demonstrated Extended Range propustion thresheld. Control Test Vehicle exceeded altitude thresheld.

Project: S0439 — Title: STANDARD Missile I Improvements
Program Element: 64366N — Title: STANDARD Missile Improvements
DOD Mission Area: 231 - Anti-Air Warfare — Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Fleet Anti-Air Warfare Capability is being challenged by the growing threat of the high speed, high altitude, and highly maneuverable anti-ship missiles employed in a heavy countermeasures environment. To meet this challenge missile kinematics improvements for greater maneuverability guidance improvements to combat the countermeasures, and warhead improvements for greater lethality are required. A propulsion improvement study for the Medium Range missile was started in FY 1976. This study addressed the threat by analyzing candidate propulsion improvements for STANDARD Missile 1 and 2 Medium Range missiles. It was concluded that a key improvement against the high speed, high altitude, and highly maneuverable anti-ship missile targets is to provide a missile speed at intercept which is at least greater than the target speed. This results in improved maneuvering capability and permits the target to be tracked without seeker gimbal limiting. The STANDARD Missile 1 Improvement program involves two broad areas of work: propulsion improvement and composite design. For compatibility with ship's weapon systems, the missile diameter remains unchanged, there is a length growth. A high energy performance rocket motor is in development with increased total impulse. Composite design includes integration of control, ordnance, and guidance designs from Project S0189, STANDARD Missile Improvement Guidance and ordnance design from the STANDARD Missile 2 Improvement Project will be added. The combination of kinematic and guidance improvements and ordnance changes will result in the STANDARD Missile 2 Medium Range Improvement.

(U) RELATED ACTIVITIES: PE 64366N, Project S0189, STANDARD Missile 2 Improvements (warhead, fuze, autopilot, and fuze changes developed for STANDARD Missile 2 will be incorporated. PE 64368N, Vertical Launch System; PE 64303N.

(U) WORK PERFORMED BY: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; General Dynamics, Pomona, CA (prime), Thiokol, Wasatch, Utah (Propulsion subcontractor); Naval Surface Weapons Centers, Dahlgren, VA and White Oak, MD, Naval Ordnance Station, Indian Head, MD (Lead in-house activity for propulsion); Naval Ordnance Missile Test Facility, White Sand, NM; Automation Indistries, Vitro Laboratories, Silver Spring, MD; and Naval Weapons Center, China Lake, CA; and Naval Ship Weapon System Engineering Station, Port Hueneme, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A new start in FY 1978 was initiated resulting from a FY 1976 propulsion improvement study for a Medium Range missile to Studies concluded that a higher performance rocket motor could meet thrust requirements. A new rocket motor is being developed. Two propulsion contractor's rocket motor designs were tested. Thiokol was selected to develop and engineer a dual thrust rocket motor. Wind tunnel studies and control system design have been completed. Simulations and testing using inputs from the STANDARD Missile 2 Improvements have been conducted and design refined. During FY 1980 rocket motor technical difficulties resulted in delaying schedule and increasing costs. Rocket motor schedule has been extended a year to reduce development risks. Propulsion experts under the Technical Director of Naval Ordnance Station,

Project: S0439 Title: STANDARD Missile I Improvements
Program Element: 64356N Title: STANDARD Missile Improvements
DOD Mission Area: 231 - Anti-Air Warfare Budget Activity: 4 - Tactical Programs

Indian Head, MO. assessed development and concluded propellant performance parameters and case processing required additional study and testing. Prime contractor agreed. Such studies and tests have been finished, and design model fabrication and testing has been resumed. Rocket propulsion case and propellant are within programmed parameters; nozzle ejections have occurred and design is being corrected. Due to funding limitations programs milestones restructured to meet available funds. The monopulse seeker was successfully tested and incorporated in the FY 1980 production of SM-1 Block VI Medium Range. In FY 81, with exception of the nozzle problem, the propulsion design has been established. Propulsion test vehicles and control test vehicles are ready and will be completely assembled when the nozzle design is corrected. Dynamic simulation in the laboratory were completed and the airframe design frozen. The majority of funds available will be expended for rocket motor engineering and development and flight test round materials.

2. (U) FY 1982 Planned Program: Complete pre-flight rating tests to release rocket motor for experimental flights and complete medium range missile critical design review. Start rocket propulsion qualifications and integrate STANDARD Missile 2 guidance/ordnance. Conduct three Propulsion Test Vehicle and four Control Test Vehicle flight tests at White Sands Missile Range; one propulsion test vehicle was converted to instrumented test vehicle for shipboard near miss shock tests (DDG-993 and CG-41). Conduct flight analysis and complete flight test round drawing and specification. Deliver rocket motors for missile round flight tests at White Sands Missile Range. Initiate fabrication of three TARTAR Flight Test Rounds.

3. (U) FY 1983 Planned Program: Complete fabrication of three TARTAR Flight Test Rounds. Complete level three data package for STANDARD Missile-2 Block II Medium Range. Complete rocket motor development and qualification first quarter and initiate production. Conduct three Flight Test Rounds flight tests at White Sands first quarter FY 1984 Conduct Reliability Design Review. Obtain Approval for Service Use and initiate production.

4. (U) Program to Completion: Conduct engineering as necessary after evaluating STANDARD Missile-2 Block II TARTAR Missile flight test results to maximize the design for fleet service. Conduct missile propulsion blast effects of ship structures tests and initiate type life testing to determine safe and effective service life of the EX-104 Dual Thrust Rocket Motor. Update design documentation.

5. (U) Milestones

Milestone	Date
1. Critical Design Review of EX-104 (Dual Thrust Rocket Motor)	Oct 1981
2. Begin Propulsion Test Vehicle Testing	(Nov 1981)* Jan 1982
3. Critical Design Review of the STANDARD Missile (Medium Range) Improvement	Dec 1981
4. Begin Control Test Vehicle Testing	(Feb 1982)* Mar 1982
5. Configuration Audit Review of the STANDARD Missile (Medium Range) Improved Round	Mar 1983

Project: S0439 Title: STANDARD Missile I Improvements
Program Element: 64366N Title: STANDARD Missile Improvements
DOD Mission Area: 231 - Anti-Air Warfare Budget Activity: 4 - Tactical Programs

Milestone	Date
6. Release EX-104 Dual Thrust Rocket Motor to Production	Dec 1982

* Reflects date in FY 1982 Program Element Descriptive Summary

6. (U) Resources: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Addtional to Completion	Total Estimated Cost *
S0439	STANDARD Missile I Improvements	15,828	15,035	10,308	9,263	12,449	98,020

*The total estimated cost includes prior funding appropriated under PE 64366N.

Project: S1632
Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile -3
Title: STANDARD Missile Improvement
Budget Activity: 4 - Tactical Program

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The need is to counter ever higher speed, high altitude, [Soviet anti-ship missile in increasingly severe stand-off jamming environments of the 1990's. The STANDARD Missile-2 Block II Extended Range missile in TERRIER systems presently provides the greatest kinematic capability against such threats. TERRIER ships are being phased out in the 1990's. The STANDARD Missile-3 missile will be employed in the improved AEGIS systems with vertical launcher, will exceed the kinematic capabilities of the Extended Range missile, provide increased intercept accuracy and kill capability against more stringent targets, [

(U) BASIC FOR FY 1983 RDT&E REQUEST: Complete trade-off studies to determine the Navy's next generation surface-to-air missile. Receive approval to begin engineering development.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: This is a new Program Element. No prior Descriptive Summary exists.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not Applicable.

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

(U) DETAILED BACKGROUND AND DESCRIPTION: STANDARD Missile-3 will be the Navy's next generation surface-to-air missile which is needed to counter ever higher speed, higher altitude, [Soviet anti-ship missiles in increasing stand-off jamming of the 1990's and beyond. STANDARD Missile-3 may be an evolutionary development of the STANDARD Missile-2 Block II, or may be a new missile. The missile will be employed in AEGIS and DDGX weapon systems. Missile velocity is increased [This provides needed kinematic capability [

[Projected threats will provide appreciably [To counter these threats and provide greater lethality by reduced miss distance at altitude, [

(U) RELATED ACTIVITIES: PE 64303, AEGIS. PE 64365, STANDARD Missile Warhead Development. PE 63589, DDGX. PE 64353N, Vertical Launching System.

Project: S1632
Program Element: 64366N
DoD Mission Area: 231 - Anti-Air Warfare

Title: STANDARD Missile -3
Title: STANDARD Missile Improvement
Budget Activity: 4 - Tactical Program

(U) WORK PERFORMED BY: Contractors: General Dynamics, Pomona, CA; Aerojet, Sacremento, CA; Thiokol, Wasatch, CA; Hercules, Cumberland, MD; Atlantic Research, Alexandria, VA; Chemical Systems, UTC, Sunnyvale, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

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

2. (U) FY 1982 Planned Program: Not funded in FY 1982. Threat analyses will be completed. Design trade-off studies will commence.

3. (U) FY 1983 Planned Program: Design trade-off studies will be completed. Prime contract will be executed. System engineering and guidance, control, airframe and ordnance design will be initiated. Wind tunnel tests will be initiated. All necessary experimental work has been performed and the proposed system is ready for full-scale development.

4. (U) FY 1984 Planned Program: Safety testing in process. Guidance and control breadboards in test. Ordnance analytical definition of underway. Wind tunnel tests continue. Flight Design Model hardware initiated. Plan for testing program initiated.

5. (U) Program to Completion: Design Model testing completes. Propulsion and Control Test Vehicles flight tests completed. Development Flight Test Rounds tested. Pilot production initiated. Approval for Service Use granted.

6. (U) Milestones: 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
S1632	STANDARD Missile-3	0	0	16,483	27,588	TBD	TBD

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64367N
Title: TOMAHAWK
DoD Mission Area: 242 - Theater Wide Nuclear Warfare
Budget Activity: 4 - Tactical Program

(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	133,922	141,735	78,934	26,362	8,472	1,151,725
X0545	TOMAHAWK	133,922	141,735	78,934	26,362	8,472	1,151,725
	(Quantity - Test Vehicles						
	Development Test and Evaluation						(42)
	Operational Test and Evaluation)						(33)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The TOMAHAWK conventional land attack mission requirement is to counter the threat against U.S. naval forces by destroying primarily: air launched anti-ship cruise missiles, their support facilities and their carriers on the ground; fleet command and control systems; ships and submarines in port; and suppressing ground based air defense systems to enhance carrier aircraft penetration. The anti-ship TOMAHAWK mission requirement is to redress the current Soviet anti-ship cruise missile stand-off range advantage and to complement U.S. sea based aircraft strikes against combatant ships which have effective air defense systems. The mission requirement for nuclear land attack TOMAHAWK is to provide the Navy with a highly survivable and distributed worldwide theater nuclear capability, by complementing carrier aircraft, to strike selected naval targets ashore and other fixed targets in support of national policy. Long range TOMAHAWK Cruise Missile Weapon System, with land attack and anti-ship applications, is sized to fit submarine torpedo tubes and is capable of being launched from a variety of subsurface, surface, air and land platforms against both land and surface ship targets.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete Operational Test and Evaluation for submarine nuclear land attack TOMAHAWK. Complete Development Testing/operational testing and Operational Test and evaluation for surface launched TOMAHAWK Cruise Missile and achieve Initial Operational Capability for Surface Launched Anti-ship and Conventional land attack cruise missiles. The decrease in funding from FY 1982 to FY 1983 (-62,801 thousand) is due to reduction of development effort and increased rate production. The following milestones are expected to be met:

Program Element: 64367N
DoD Mission Area: 242 - Theater Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Program

Milestone No. 8	First Operational Platform Launch - Ship-Conventional Land Attack	JAN 1983
Milestone No. 9	Operational Test and Evaluation Complete -	
	Ship-Conventional Land Attack	JUNE 1983
	Ship-Anti-Ship	JUNE 1983
	Sub-Ship-Nuclear Land Attack	MAR 1983 and JUNE 1983

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profiles shown the (amended) FY 1982 Descriptive Summary and those shown in this Descriptive Summary are as follows: RDT&E,N - (1) Defensive Counter-Countermeasures efforts, referred to in the FY 1982 Descriptive Summary, have been transferred to a larger group of pre-planned product improvement efforts, for which FY 1983 and later funding is contained in Program Element 28009N, Project X1661 (TOMAHAWK Improvement Program), a FY 1983 new start. (2) The FY 1981 estimate has increased by 1,161 due to an emergent requirement. (3) The FY 1982 estimate has increased by 371 due to revised inflation factors. (4) The FY 1983 estimate has increased by 8,688 as the net result of the planned start of the TOMAHAWK Improvement Program (Program Element 28009N; -18,010) and revision of estimates for continued engineering development of baseline cruise missiles and mission planning capabilities (+26,698). (5) An estimate of the total cost of the program has been provided as shown. Weapons Procurement, Navy - (1) The FY 1981 funding has decreased by 4,100 due to reduction of associated spare parts support requirements. (2) The FY 1982 estimate has decreased by 95 due to revised inflation factors. (3) The FY 1983 estimate has increased by 60,755 due to addition of 27 missiles to the planned FY 1983 buy and additional long-lead funding for the FY 1984 buy. (4) Estimates of the total procurement program (funding and quantity) have been provided as shown. Other Procurement, Navy - (1) FY 1981 funding has increased by 4,837 due to increase in costs of surface ship armored box launcher installations. (2) The FY 1982 and 1983 estimates have decreased by 40,619 and 38,181, respectively and the total program estimate has increased by 798,107 due to introduction of the surface ship vertical launch proram. Operation and Maintenance, Navy - (1) The FY 1983 estimate has increased by 752 due to revision. (2) An estimate of the total program cost in this appropriation has been provided as shown. Department of Energy Costs (Discussion to be provided on receipt of revised costs.)

(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	104,768	132,761	141,364	70,246	TBD	TBD
X0545	TOMAHAWK Missile System	104,768	132,761	141,364	70,246	TBD	TBD

Program Element: 64367N
DoD Mission Area: 242 - Theater Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Program

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
28009N (Weapon Procurement, Navy)*	185,921	236,305	308,355	619,974	8,194,189	9,516,000
Quantity	(50)	(88)	(120)	(312)	(3,418)	(3,994)
28009N (Other Procurement, Navy)	36,551	128,749	176,245	212,713	806,696	1,360,954
28009N (Operations and Maintenance, Navy)	0	6,376	13,421	32,367	163,608	215,772
Department of Energy Costs						TBD

* Includes initial spares

Program Element: 64367N
Title: TOMAHAWK
DoD Mission Area: 242 - Theater Wide Nuclear Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Design studies have shown that it is feasible to build a land attack cruise missile with a very low flight profile and with a great circle range of at least 1300 nautical miles. Using the same technological approach, an anti-ship cruise missile with a 1000 pound warhead and an operational range of 300 nautical miles can also be developed. Designed for launch from submarine torpedo tubes, those missiles also can be deployed from air, surface, subsurface and land platforms. Their small size and low flight profile render them survivable against current and projected enemy defenses. By providing significant new capabilities, these missiles will broaden and diversify our forces with increased firepower and standoff range. Development to date has indicated that improved accuracies and range are attainable, and that the cruise missile concept is suited to a broad range of land attack (both conventional and nuclear) and anti-ship applications.

(U) RELATED ACTIVITIES: HARPOON engineering guidance development, which terminated in FY 1979, (Program Element 64364N, project W1174 Anti-Ship Weaponry) provided technology support applicable to a tactical cruise missile; Air Launched Cruise Missile program (Program Element 64361F), is the Air Force development applicable to a strategic cruise missile; Ground Launched Cruise Missile (Program Element 64361F), is development employment of the TOMAHAWK cruise missile in the ground launched mode. The Joint Engine Project Office (Program Element 64361F), is the progam for development of small turbofan cruise missile engines. Over-the-Horizon Targeting program (Program Element 63530N) develops use of the products of the ocean surveillance system to provide targeting definition outside the detection capability of the missile launch platform. The TOMAHAWK II Medium Range Air-to-Surface Missile program is developing tactical air launch versions of the TOMAHAWK Cruise Missiles (Program Element 63369N, project X0650). The TOMAHAWK Improvement Program (Program Element 28009N, project X1661), a planned FY 1983 new start, will develop approved changes to all TOMAHAWK missile variants for which requirements are identified under this program element, except for the booster improvement and conventional land attack air-burst capability which will be completed in this program element. The surface ship vertical launch capability for TOMAHAWK and STANDARD missiles is being developed in Program Element 64353N. A TOMAHAWK vertical launch capability for SSN 688 class attack submarines is being developed in Program Element 64370N.

(U) WORK PERFORMED BY: In House: Naval Ocean Systems Center, San Diego, CA; Naval Air Propulsion Test Center, Trenton, NJ; Naval Air Development Center, Warminster, PA; Naval Surface Weapons Center, White Oak, MD; Naval Sea Systems Command, Washington, DC; Pacific Missile Test Center, Pt. Mugu, CA; Naval Undersea Systems Center, Newport, RI; Naval Weapons Evaluation Facility, Albuquerque, NM; Naval Avionics Center, Indianapolis, IN; Fleet Combat Direction System Support Activity, Dam Neck, VA; Department of Energy, Germantown, MD; Defense Mapping Agency, Washington, DC. Contractors: McDonnell Douglas Astronautics, St. Louis, MO (prime contractor); General Dynamics Convair, San Diego, CA; Williams Research Corporation, Walled Lake, MI; Applied Physics Laboratory, Johns Hopkins University, Laurel, MD.

Program Element: 64367N
DoD Mission Area: 242 - Theater-Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Programs

Characteristics	Threshold	Demonstrated
Cruise Speed - (Mach Number)	[redacted]	[redacted]
Cruise Altitude -Smooth Terrain (feet)	[redacted]	[redacted]
Accuracy (Circular Error Probable)	[redacted]	[redacted]
ANTI-SHIP - TORPEDO TUBE LAUNCHED MISSILE (Same as above except as noted below)		
Range - Operational (Maximum)	[redacted]	[redacted]
Cruise Altitude	[redacted]	[redacted]
Launch Depth	[redacted]	[redacted]
Terminal Accuracy (probability of Hit) - At least 0.90 -	[redacted]	[redacted]

1/ (U) Captive flight test.

2/ (U) Production prototype

Program Element: 64367N
DoD Mission Area: 242 - Theater Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Programs

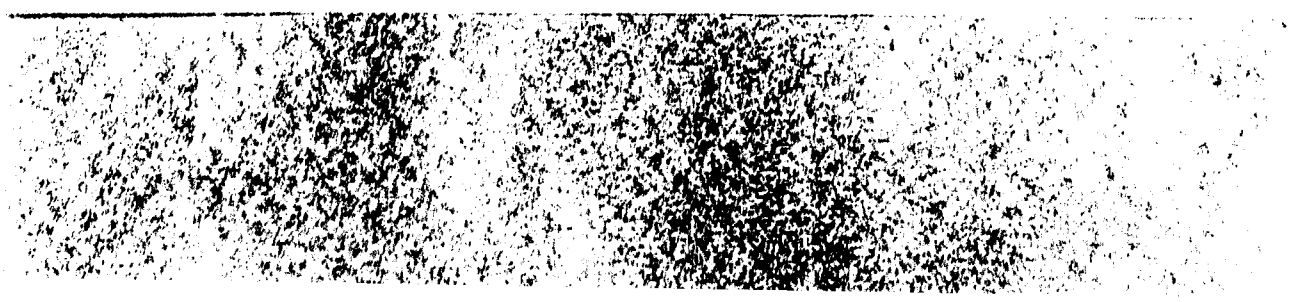
(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: On 6 November 1972 the Chief of Naval Operations directed that existing long range cruise missile efforts be combined and redirected to build and test a prototype cruise missile that would fit into a submarine torpedo tube envelope. Contracts were awarded to five airframe companies for a design effort to permit credible estimates of performance. Design parameters were defined and the program was structured to provide a competitive demonstration of land attack and anti-ship cruise missile prototypes in 1976. The Secretary of Defense directed in 1973 that the Navy proceed without delay through the Validation (Competitive Demonstration) Phase to demonstrate a viable missile system. Source selection of two prime contractors was completed and cost-plus-fixed-fee contracts were awarded in December 1973. Contracts for the cruise missile land attack guidance system were awarded in June 1974. A contract was awarded to McDonnell Douglas Astronautics in December 1974 for modification of the HARPOON guidance set for the anti-ship Cruise Missile. On 13 May 1975 the Deputy Secretary of Defense directed Navy to select a prime land attack guidance contractor by October 1975, and an air vehicle prime contractor by April of 1976. The Deputy Secretary of Defense further directed that the Navy cruise missile program take lead responsibility for development of a land attack guidance system for both the Navy cruise missile and the Air Force Air Launched Cruise Missile, maintain maximum commonality with the Air Launched Cruise Missile, and address a ground launched mode during prototype validation. The Navy was also directed to preserve the option of employing the cruise missile as an air launched vehicle from the B52. The Chief of Naval Operations approved the name "TOMAHAWK" for the Navy cruise missile in September 1975. McDonnell Douglas Astronautics was selected as prime contractor for the cruise missile land attack guidance system on 8 October 1975. The McDonnell Douglas guidance system successfully demonstrated at-sea alignment on a moving platform aboard USS SARATOGA on 14 October 1975. Testing at the Pacific Missile Test Center validated modifications to the HARPOON seeker which extended its capabilities to TOMAHAWK anti-ship missile acquisition ranges. Air frame contractor source selection was completed and contract award was made in April 1976. Both guidance system competitors and air vehicle competitors were required to submit proposals for full scale development phase and preliminary production prototypes prior to competitive demonstrations. Complete test articles were delivered in FY 1976 by prime contractors for testing. First airframe flight, surface and underwater launches were accomplished. Land launch of the TOMAHAWK cruise missile continued during FY 1976 with the systems integration stage of the Validation Phase. Cruise missile ship, B52 and land version design efforts, and producibility design were begun. First underwater anti-ship flight was completed. Defense Systems Acquisition Review Council II in January 1977 approved TOMAHAWK Full Scale Engineering Development. Deputy Secretary of Defense Memo of 14 January 1977 further directed establishment of a Joint Cruise Missile Program Office for Air Force and Navy cruise missiles with Navy as lead service. An Air Force ground launched cruise missile was directed to be adapted from the land attack TOMAHAWK. Funding for Air Force and Navy cruise missiles was to be consolidated under the Joint Cruise Missile Project Office. Navy was also directed to pursue development of Over-the-Horizon target acquisition, identification and damage assessment capabilities, to be demonstrated by Defense System Acquisition Review Council III. Joint service testing and initiation of advanced technology and concept exploration programs were also directed. Under Secretary of Defense for Research and Engineering memo of 30 September 1977 directed a competitive flyoff between the General Dynamics air launch version of TOMAHAWK, and the Boeing air launch cruise missile. The Joint Cruise Missile Project Office was directed to expand staff and responsibility

Program Element: 64367N
DoD Mission Area: 242 - Theater Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Programs

to include its own contracting officer and engineering staffs, modeled after the Strategic Systems Program Office and reporting directly to the Chief of Naval Material. Chief of Naval Material Notice 5430 of 30 September 1977 established the Joint Cruise Missile Project Office and PM3. In February 1978 the first launches of land attack and anti-ship TOMAHAWK missiles from a submerged submarine were conducted off San Clemente Island from USS BARB (SSN 596). The land attack missile flew a successful mission and was recovered at Edwards Air Force Base, California for later use in the test program. The anti-ship TOMAHAWK, after completing a successful launch and boost phase, failed to transition to sustained flight on the turbofan engine. The anti-ship TOMAHAWK had two more submarine launches in July 1978 which also failed to transition to cruise flight. Both failures were caused by pyrotechnic system contamination. A land attack TOMAHAWK was ground launched during September 1978. Following a successful boost flight it failed to transition to cruise flight because of an electrical system malfunction. These three vehicles launched in July and September were recovered and were refurbished. A TOMAHAWK Air Field Attack Mission Module was demonstrated in May 1978 as a step toward the development of a conventionally armed land attack TOMAHAWK. A parallel development was undertaken to convert the Scene Matching Area Correlator to a digital configuration. Captive flight tests were begun. Six land attack survivability/penetration flight tests were conducted. The new pyrotechnic and missile sealing designs were incorporated and verified in ground testing during the period October 1978 to January 1979. Subsequent boosted launches in FY 1979, three ground and six submarine, were successful and the new designs are considered validated. Four land attack and three anti-ship TOMAHAWK survivability tests were conducted. Several significant firsts were achieved in FY 1979. The submarine Fire Control System MK 117 including Outlaw Shark Over-the-Horizon Detection, Classification and Targeting information was first used to program and launch an anti-ship TOMAHAWK in June 1979. The first flights of anti-ship TOMAHAWK with a Passive Identification/Direction Equipment and land attack TOMAHAWK with a Department of Energy package also occured. In addition, an anti-ship TOMAHAWK was successfully vertically launched on 13 September 1979. In FY 1979, the Joint Cruise Missile Project Incorporated remaining design changes for increased commonality of TOMAHAWK and concluded demonstration of land attack and anti-ship TOMAHAWK from submarine launch platforms throughout the launch envelope. Finished contractor technical evaluation and began combined development test/operational test with the Operational Test and Evaluation Force. Continued evaluation of TOMAHAWK survivability/penetration in flight tests against defense systems. Performed launches with attack submarine MK 117 Fire Control System. Continued to evaluate terrain contour matching navigation. Further demonstrated capability of anti-ship TOMAHAWK to navigate and search over water, acquire and home on a target and conduct guidance update using Passive Identification/Direction Equipment. Demonstrated TOMAHAWK launch from ship platform and evaluated production line test equipment capability. Established reliability growth and reliability and maintainability requirements compliance. Commenced low rate production of missiles. In April 1980, the nine-month competitive Air-Launched Cruise Missile flyoff between General Dynamics/Convair and Boeing Aerospace Company was completed. After the decision to award the production contract to Boeing, the Air Launched Cruise Missile program management was transferred to the Air Force. The Joint Cruise Missile Project reorganized to place it s emphasis on the Ground and Sea Launched Cruise Missile but also retained the responsibility for common items such as engines and guidance sets. Commenced production of surface ship launchers including the Common Weapons Control System and modification of submarines for introduction to the fleet of TOMAHAWK platforms. Performed free flight demonstration of Digital Scene Matching Area Correlator as a major step toward the development of a conventionally armed land attack TOMAHAWK. Demonstrated fleet logistic support capability and validated



maintenance and operational test concepts by refurbishment and reuse of missiles. Continued full scale development of conventionally armed land attack TOMAHAWK, including development of land attack mission planning facilities and data bases. [redacted] baseline Theater Mission Planning Centers have been installed and operational users trained. [redacted] Commenced operational evaluation of the submarine-launched anti-ship variant.

2. (U) FY 1982 Program: Complete submarine TOMAHAWK anti-ship operational evaluation with six missiles to be launched to demonstrate missile readiness for operational certification. Conduct submarine conventional land attack Operational Evaluation. Achieve initial operational capability for submarine anti-ship and conventional land attack TOMAHAWK, including completion of land attack mission planning facilities. Continue development of the surface ship Common Weapons Control System. Continue production of TOMAHAWK cruise missiles and launchers. Perform follow-on operational test firings to insure that reliability and performance factors are preserved during the life of the system. Conduct development testing/operational testing and operational evaluation of surface ship anti-ship and conventional land attack and submarine conventional nuclear land attack. Achieve approval for service use of submarine land attack conventional and anti-ship TOMAHAWK. Continue development of land-attack mission planning data bases. Commence improved booster development. Initiate independent nuclear safety analysis for the nuclear land attack variant. For conventional land attack variant, develop [redacted] capability and initiate development [redacted] and design of a [redacted] to be continued in FY 1983 and later in Program Element 28009N (TOMAHAWK Improvement Program).

3. (U) FY 1983 Planned Program: Complete Operational Test and Evaluation for submarine nuclear land attack TOMAHAWK. Conduct development testing/operational testing and operational evaluation for surface ship conventional land attack and nuclear land attack TOMAHAWK. Achieve initial operational capability for surface ship conventional land attack and anti-ship missiles. Complete improved booster development and Nuclear Safety analysis; continue development of land-attack mission planning data bases. The conventional land attack [redacted] efforts continue in Program Element 28009N. Decrease in funding from FY 1982 (-62,801 thousand) is due to reduction of missile development effort and increased rate production.

4. (U) FY 1984 Planned Program: Achieve initial operational capability for submarine and surface-launched nuclear land attack TOMAHAWK. continue development of land-attack mission planning data bases. Correct deficiencies in baseline missile variants and related support areas noted in prior testing.

5. (U) Program to Completion: Complete corrective action on deficiencies noted in prior testing. Program completes in FY 1985. Development of approved changes continues in Program Element 28009N (TOMAHAWK Improvement Program).

Program Element: 64367N
DoD Mission Area: 242 - Theater Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestones	Date
Milestone No. 1 - Defense Systems Acquisition Review Council I	
Land Attack	February 1974
Anti-Ship	February 1974
Milestone No. 2 - First Flight	
Land Attack	June 1976
Anti-Ship	March 1976
Milestone No. 3 - First Guided Flight	
Land Attack	June 1976
Anti-Ship	December 1976
Milestone No. 4 - Defense Systems Acquisition Review Council II	
Land Attack	January 1977
Anti-Ship	January 1977
Milestone No. 5 - First Full Scale Development Flight	
Land Attack	January 1977
Anti-Ship	February 1977
Milestone No. 6 - Combined Development Testing/Operational Testing	
Sub-Ship (July 1980 and June 1981)*	July 1930 and October 1981
Milestone No. 7 - Operational Test and Evaluation Start	
Sub-Ship - Conventional Land Attack (Apr 1981 and Jan 1983)*	Apr 1981 and Jul 1982
Sub-Ship - Anti-Ship (Jan 1981 and Jan 1983)*	Jan 1981 and Jul 1982
Sub-Ship - Nuclear and Attack (Jan 1981 and Jan 1983)	Oct 1982 and Jan 1983
Milestone No. 8 - First Operational Platform Launch	
Sub-Ship - Conventional Land Attack (Feb 1978 and Dec 1981)* Feb 1978 and Jan 1983	
Sub-Ship - Anti-Ship	Feb 1978 and Mar 1980
Milestone No. 9 - Operational Test and Evaluation Complete	
Sub-Ship - Conventional Land Attack (Nov 1981 and Jun 1983)*	Feb 1982 and June 1983
Sub-Ship - Anti-Ship (Sep 1981 and Jun 1983)*	Mar 1982 and June 1983
Sub-Ship - Nuclear Land Attack	Apr 1983 and Sept 1983

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Milestone No. 10 - Department of the Navy Acquisition Systems Review Council III	
Sub-Ship - Conventional Land Attack (Dec 1981 and Feb 1983)*	Feb 1982 and Jun 1983
Sub-Ship - Anti-Ship (Dec 1981 and Feb 1983)*	May 1982 and Jun 1983
Sub-Ship - Nuclear Land Attack (Feb 1983)*	Jun 1983 and TBD
Milestone No. 11 - Initial Operational Capability	
Sub-Ship - Conventional Land Attack (Jan 1982 and Jul 1983)*	Feb 1982 and Jun 1983
Sub-Ship - Anti-Ship (Jun 1982 and Jul 1983)*	Jun 1982 and Jun 1983
Sub-Ship - Nuclear Land Attack	Jun 1984

*Dates shown in FY 1982 descriptive summary. Changes in milestones 7-11 are due to revision of test program.

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DoD Mission Area: 42 - Theater-Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION

1. (U) DEVELOPMENT TEST AND EVALUATION:

a. (U) In June 1974, two competing land-attack guidance system companies began extensive captive flight tests with a missile-configured guidance system. McDonnell-Douglas was announced the winner in October 1975. Integrated terrain contour matching navigation/flight control system guidance flight tests using BQM-34 drones occurred between January and March 1976. Captive flights of the anti-ship guidance system using A-3 aircraft demonstrated that a modified HARPOON guidance system could be used in TOMAHAWK.

b. (U) General Dynamics-Convair Division won the air vehicle competition and flew the first prototype in March 1976 and the first fully guided Land Attack TOMAHAWK in June 1976. Prior to Defense System Acquisition Review Council II, 8 vehicles completed 17 flights, for a cumulative distance of approximately 6,200 nautical miles, including 6 terrain contour matching navigation free flights over varying terrain for a cumulative flight distance of 2923 nautical miles in which 25 terrain contour matching navigation fixes were completed; 41 additional terrain contour matching fixes were completed under captive carry conditions over approximately 18,000 nautical miles. One of the terrain contour matching navigation flights included scene matching area correlation equipment. The Anti-Ship TOMAHAWK demonstrated the capability to attack ship targets whose location was poorly defined at launch [redacted] following long range cruise, search and acquisition.

c. (U) Full Scale Engineering Development began in February 1977 and will be completed in FY 1986. Primary objectives for the submarine launch test program in Full Scale Engineering Development include: qualification for launch from a submarine, evaluation of fire control system compatibility, demonstration of both land attack and anti-ship missions, qualification of operation throughout the flight envelope, evaluation of TOMAHAWK survivability, demonstration of reliability/ mission effectiveness, demonstration of the logistics support system, and demonstration of nuclear and conventional warhead compatibility. An extensive environmental qualification round test program will be conducted consisting of electromagnetic compatibility, vibration, shock, temperature and climatic tests and missile signature measurements. Launch platform captive carry tests will be conducted to evaluate stowage reliability.

d. (U) Fifty-nine TOMAHAWK test flights (1 Airframe, 34 Land Attack and 24 Anti-ship) were conducted between 1 February 1977 and 31 October 1981. These flights included 23 submarine launches, 8 ground launches, 26 air launches, 1 ship launch, and 1 launch from an underwater hydraulic torpedo tube. Sixteen flights were significant demonstrations of Over-the-Horizon targeting capability including ten flights exercising real-time targeting with the MK 117 Fire Control System and AN/USQ-81(V). Terrain contour matching navigation demonstration flights of the Land-Attack TOMAHAWK traversed segments of the TOMAHAWK inland route from Pacific Missile Test Range, California, to Dugway Proving Grounds, Utah. Six of these flights employed high accuracy terminal area guidance. Three of the Digital Scene Matching Area Correlation flights demonstrated a complete Conventional Land-Attack

Program Element: 64367N
DoD Mission Area: 242 - Theater-Wide Nuclear Warfare

Title: TOMAHAWK
Budget Activity: 4 - Tactical Programs

mission including: [illegible] underwater launch by the submarine, overwater navigation, landfall penetration, inertial navigation, terrain following, terrain contour matching map updates, digital scene matching area correlation scene updates and high accuracy guidance over an inland target on the Tonopah Test Range, Nevada. The TOMAHAWK Airfield Attack Mission Module was successfully demonstrated at Dugway Proving Grounds, Utah. Ten land-attack survivability demonstration flights and four anti-ship TOMAHAWK survivability flights were conducted. The first vertical launch was conducted using the Engineering Development Model vertical launcher. The combined Development Testing/Operational Testing for submarine-launched anti-ship TOMAHAWK was completed and resulted in a failure. The cause of the failure has been corrected. The first Operational Evaluation flight for the submarine-launched anti-ship TOMAHAWK conducted on 2 August 1981. Seven Operational Evaluation flights remain to be flown. Development Testing/Operational Testing flights for the land attack TOMAHAWK began with a 30 July 1981 flight which was successful until an early termination approximately 30 nautical miles short of the target. The cause of the failure has been resolved. A highly successful Development Testing/Operational Testing night flight was conducted on 19 September 1981, and an additional land attack missile was successfully flown 27 October 1981. Total TOMAHAWK free flight distance through 31 October 1981 was in excess of 33,000 nautical miles with over 77 hours of flight time. Additional Full Scale Engineering Development planned tasks include implementation, test and evaluation of the Integrated Logistic Support, Development, Test and Evaluation of the Theatre Mission Planning System for Land-Attack TOMAHAWK continued Development, Test and Evaluation of the TOMAHAWK for vertical launching, continued Development, Test and Evaluation of the Land-Atttack Conventional TOMAHAWK including digital scene matching area correlation and Development, Test and Evaluation of ship launched missiles and surface ship weapon control system.

e. (U) The Sea-Launched Cruise Missile test and evaluation program employs combined Development Testing and Operational Testing during the period normally reserved for Navy Technical Evaluation. The TOMAHAWK program can accomplish this because of common objectives between the Joint Cruise Missiles Project and the Operational Test and Evaluation Force.

2. (U) OPERATIONAL TEST AND EVALUATION

a. (U) Commander Operational Test and Evaluation Force conducted Initial Operational Test and Evaluation (Operational Test II) during the period of February 1976 to January 1977 by witnessing and participating in developmental testing during the Validation Phase. The objectives during this test phase were to provide early assessment of projected operational suitability and operational effectiveness, initiate tactics development, evaluate program progress and risks and identify operational issues requiring evaluation during full scale engineering development. Based on the results of this testing, Commander Operational Test and Evaluation Force, in January 1977, supported a decision for full scale engineering development, noting the lack of a test range to support full range operational TOMAHAWK firings, and the need for developing an over-the-horizon targeting capability to support anti-ship TOMAHAWK. Operational Test and Evaluation objectives during the full scale engineering development phase included evaluation of missile/launch platform interfaces, launch/flight profiles, targeting, range and accuracy, safety, detecta-

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bility, survivability and reliability. Operational Test IIA commenced in January 1977, coincident with the Defense Systems Acquisition Review Council II decision. Operational Test IIA (January 1977 - February 1978) was to be completed with the successful launch and fully guided flight of TOMAHAWK from a submarine. This demonstration was to support a recommendation by Commander Operational Test and Evaluation Force to build Preliminary Production Prototype missiles.

b. (U) Based on the successful submarine launch of TOMAHAWK in February 1978, Commander Operational Test and Evaluation Force recommended a Preliminary Production Prototype go-ahead to the Chief of Naval Operations. The Chief of Naval Operations concurred in February 1978. Two subsequent submarine launched missiles and one ground-launched missile failed to transition to cruise flight and the Chief of Naval Operations directed the Chief of Naval Material to review TOMAHAWK compatibility with submarines. This review was completed in September 1978. The cause of the launch failures was identified, and corrective action was initiated. Subsequent successful boosted launches have proven resolution of this problem and demonstrated TOMAHAWK compatibility with the submarine. Over-the-Horizon-Targeting operational demonstrations and exercises to support targeting at long range commenced in June 1976. Initial Operational Test and Evaluation of Over-the-Horizon Targeting concepts was conducted from January to June 1977 as the Chief of Naval Operations Project 251-1-OT-1 (OUTLAW SHARK). Chief of Naval Operations Project 310 (Over-the-Horizon Detection, Classification and Targeting) was subsequently established to continue the earlier initiatives. Further testing was conducted during 2nd quarter FY 1978 under Chief of Naval Operations Project 310-1. Results of this testing confirmed improved capabilities over previous test efforts and supported a recommendation to continue improvements in primary and related hardware/software and to develop system operational specifications, including, threshold requirements in terms of timeliness, accuracy, and completeness of data bases. Since June of 1979, Commander Operational Test and Evaluation Force has been participating in combined Over-the-Horizon targeting testing during developmental test flights. Data gathered during this phase (Operational Test IIB) will be used to develop Over-the-Horizon targeting scenarios for Operational Evaluation and will be combined with Operational Evaluation Over-the-Horizon targeting data to be reported as part of the Commander Operational Test and Evaluation Force independent evaluation to support the Milestone III decision. During 1978 Commander Operational Test and Evaluation Force participated in a joint Navy/Air Force generic cruise missile survivability test and evaluation program directed by the Joint Cruise Missiles Project Office. Phase I testing was completed in October 1978. During Phase I, seven TOMAHAWK missiles were launched to collect generic survivability data to support further survivability testing. Commander Operational Test and Evaluation Force provided an independent assessment of Phase I testing in January 1979. This report was incorporated as an annex to the Cruise Missile Phase I Survivability Report provided to the Under Secretary of Defense (Research and Engineering) in May 1979. Commander Operational Test and Evaluation Force recommended that Phase II testing be more operationally oriented. All Phase II overland flights to gather engineering data have been completed. Survivability testing of the TOMAHAWK missile is not complete and the results of the June 1979 survivability objectives of the remaining required flights will be reported as part of operational evaluation report.

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DoD Mission Area: 242 - Theater-Wide Nuclear Warfare

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c. (U) Initial Operational Test and Evaluation will continue through full scale engineering development, culminating in Commander, Operational Test and Evaluation Force's independent Operational Evaluation of the TOMAHAWK launched from submarines (Operational Test IID-1) and from surface ships (Operational Test IID-2) in FY 1982-1983. The Operational Test will be preceded by a combined development test/operational test period wherein the operational effectiveness test objectives of operational evaluation are combined with the technical requirements of a Navy Technical Evaluation; thus minimizing duplication of testing and maximizing the utilization of limited test resources. The submarine Operational Evaluation (Operational Test IID-1) is scheduled to occur before the surface ship Operational Evaluation (Operational Test IID-2). (Operational Test IID results will support a pre-production Milestone III procurement decision for baseline missiles and the submarine command and launch system.) During Operational Test IID-1 TOMAHAWK missiles will be operationally evaluated by captive-carry, launch and flight to support a Milestone III decision. Successful completion of surface ship operational evaluation will support a Commander Operational Test and Evaluation Force recommendation for a Milestone III decision for the surface ship weapon control and launch system. Preliminary tactics will be demonstrated during full scale engineering development and operationally evaluated during Operational Test IID-1 and Operational Test IID-2. Follow-on Test and Evaluation, Operational Test III, will be scheduled to evaluate system performance in any different command and control configurations, conduct additional captive-carry to assess missile storage reliability due to limited carry time in operational evaluation, evaluate hardware and software that was not available during Operational Test II testing, and to assess the correction of deficienices noted during operational evaluation.

3. (U) SYSTEM CHARACTERISTICS:

LAND ATTACK - TORPEDO TUBE LAUNCHED MISSILE

Characteristics	Threshold	Demonstrated
Range - Operational	[redacted]	[redacted]
Stand Off Range - Overwater prior to landfall	[redacted]	[redacted]
Launch Depth	[redacted]	[redacted]

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64369N
DoD Mission Area: 231 - Anti-Air Warfare

Title: 5" Rolling Airframe 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	14,040	19,488	16,290	3,326	5,509	102,541
S0167	5" Rolling Airframe Missile	14,040	19,488	16,290	3,326	5,509	102,541
	Quantity of Missiles (Development Test and Evaluation and Operational Test and Evaluation)						(96)
	Quantity of Stand-alone Launching System/NATO SEASPARROW Modification Kits (Development Test and Evaluation and Operational Test and Evaluation)						(3/2)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The purpose of this program is to develop an air defense system utilizing a passive dual-mode Radio Frequency/Infrared 5" Rolling Airframe Missile. The baseline system will provide a self-defense capability against incoming active radar guidance equipped anti-ship missiles and will be developed in consort with the Governments of the Federal Republic of Germany and Denmark.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To support continued design, development, fabrication and test of the Rolling Airframe Missile Guided Missile Weapon System, including the 5" Rolling Airframe Missile, stand-alone launcher, launch control and associated equipments, plus the Ordnance Alteration modifications to the NATO SEASPARROW Surface Missile System. 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 decrease of 1,059 in FY 1981 due principally to reductions in Field Support Services and slippage in contract schedule. A decrease of 891 for FY 1982 and an increase of 2,805 in FY 1983 is the result of a restructure of the program due to cost growth and schedule slippage. The total program increase is 1,815.

Program Element: 64369N
DoD Mission Area: 231 - Anti-Air Warfare

Title: 5" Rolling Airframe Missile
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	19,051	15,099	20,379	13,485	7,875	100,726
S0167-AA	5" Rolling Airframe Missile	19,051	15,099	20,379	13,485	7,875	100,726

(U) OTHER APPROPRIATION FUNDS: To be Determined.

Program Element: 64369N
DoD Mission Area: 231 - Anti-Air Warfare

Title: 5" Rolling Airframe Missile
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The 5" Rolling Airframe Missile System program has its origins in the 2.75 inch Dual-Mode REDEYE Program initiated in June 1972. Tests in 1973 demonstrated the feasibility of dual-mode passive Radio Frequency/Infrared guidance. However, it was determined that the missile warhead was too small. In 1974 Navy analysis determined that a 5" missile could effectively kill incoming anti-ship missiles. The program commenced in December 1974 with Applied Physics Laboratory/Johns Hopkins University as prime contractor and General Dynamics/Pomona Division as subcontractor. The Federal Republic of Germany joined the program in 1976 for the Advanced Development Phase. The RAM System uses existing shipboard sensors to detect enemy antiship missiles. The Rolling Airframe Missiles will be fired from stand-alone launchers as well as from modified NATO SEASPARROW Surface Missile System launchers. The stand-alone launcher will carry and fire 24 missiles while the NATO SEASPARROW Launcher Alteration will modify two cells of the existing launcher to house and fire 5 Rolling Airframe Missiles per cell. Once launched, the missile will not require additional shipboard commands. The missile will use components from developed missiles (i.e. STINGER Intrared seeker and SIDEWINDER (AIM-9L) fuze, warhead and rocket motor). The Infrared-Only seeker demonstration program commenced in mid-1978.

(U) RELATED ACTIVITIES: NATO SEASPARROW, PE 64361N; Close-In Weapon System (PHALANX), PE 64358N.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA, Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Naval Ordnance Missile Test Facility, White Sands, NM; Fleet Analysis Center, Corona, CA; Naval Weapons Handling Center, Colts Neck, NJ, Pacific Missile Test Center, Point Mugu, CA. Contractors: Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; General Dynamics Corp., Pomona, CA, Raytheon Company, Wayland, MA, Vitro Laboratories, Silver Spring, MD, Tecolote Research, Inc., Santa Barbara, CA, EG&G, Washington Analytical Services Center, Rockville, MD; SYSCON Corp., Washington, D.C.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: A contract was awarded to General Dynamics, Pomona Division in February 1977 for the Advanced Development Phase. The contractor performed studies, analyses, testing and pre-design work on the missile round, launcher and associated subsystems and components. A successful flight test program of specially configured Flight Test Vehicles and Launch Test Vehicles was conducted from April through December 1977 and March through July 1978. The results of these tests, combined with other studies and analyses, indicated that the program was ready to enter the Full-Scale Engineering Development Phase in FY 1979. During FY 1978, conferences were held with the Federal Republic of Germany and the Government of Denmark regarding their requirements for participation in the Engineering Development Phase. The 5" Rolling Airframe Missile Program was approved by the Navy Decision Council in February 1979 for entry into Engineering Development. A Memorandum of Understanding with Germany and Denmark was executed in May 1979. Germany will share equally with the U.S. in the development of the missile system, while Denmark's share will be 2% of the costs. A contract was awarded to General Dynamics, Pomona in June 1979 for Full Scale

Program Element: 64369N — ZQ1 :5" Rolling Airframe Missile
DoD Mission Area: 231 - Anti-Air Warfare — Budget Activity: 4 - Tactical Programs

Engineering Development of the Rolling Airframe Missile Guided Missile Weapon Syste:. A contract was awarded to Raytheon, Wayland in August 1979 for conduct of design definition studies for the NATO SEASPARROW Surface ! ssile System modifications. An Infrared-Only missile seeker alternative program was initiated in July 1978 and related analyses and Infrared-Only fabrication and testing was completed in FY 1981 prior to Flight testing, when allocated funds were expended. Design, fabricaton and testing of the 5" Rolling Airframe Missile, stand-alone launcher, launch control and associated equipment continued. Flight tests of Engineering Model missiles will continue at the Rolling Airframe Missile Land-Based Test Site, White Sands Missile Range, New Mexico. Continue integration of radar and Electronic Support Measures equipment and testing of correlation programs. Design definition studies for the NATO SEASPARROW System Alteration be completed but awarding the Full-Scale Engineering Development contract for this alterative was deferred due to: (a) growth in estimate for the al'eration; (b) significant cost growth in FY 1981 and outyears for missile and stand alone launcher development; (c) a need to demonstrate a mature missile design through more missile flight tests. Preliminary afety testing was conducted. A launcher Design Review and Missile Design review were conducted. The first command and launch system was delivered to Ge many. Flight testing started at White Sands Missile Range.

2. (U) FY 1982 Program: Flight testing of development model missiles will be completed at the Land Based Test Site. Tests will be conducted at-sea using existing shipboard sensors and a radar-Electronic Support Measures correlaton program. Additional captive seeker tests and environmental electro magnetic and safety qualification tests will be accomplished. Rolling Airframe Missile Guided Missile Weapon System Critical Desig. Review will be conducted. Fabrication of prototype missile rounds for Navy Technical and Operational Evaluation will commence. A decision will be made whether to develop the NATO SEASPARROW System Modification and Award the Full Scale Engineering Development contract, based on performance of 7 additional flight tests and availability of additional funds.

3. (U) FY 1983 Planned Program: The 5" Rolling Airframe Missile Guided Missile Weapon System will undergo Navy Technical and Operational Testing in both land-based and at-sea environments. Award contract for Long Lead materical and production tooling and test equipment.

4. (U) FY 1984 Planned Program: Of developed, the NATO SEASPARROW System Modification will undergo Navy Technical and Operational Testing in both land-based and at-sea environments. Following the Milestone III decision, award the production contract.

5. (U) Program to Completion: The delivery of production rounds and production systems for fleet use is scheduled to begin in FY 1986.

Program Element: 64369N
DoD Mission Area: 231 - Anti-Air Warfare

Title: 5" Rolling Airframe Missile
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone	Date
1. Begin Engineering Model Missile Flight Test	June 1980
2. Begin Environmental, Safety, Compatibility Type Testing	(February 1981)*
3. Complete Combined Tests (DT-IIIA/OT-IIIA)	July 1981
4. Complete Navy Technical Evaluation (DT-IIIB)	
5. Complete Operational Evaluation (OT-IIIB)	

*Date shown in FY 1982 Descriptive Summary. Changes due to prime contractors schedule slippage.

Program Element: 64369N
DoD Mission Area: 231 - Anti-Air Warfare

Title: 5" Rolling Airframe Missile
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: Advanced Developmental Testing (Developmental Test-IA and Developmental Test-IB) was completed in July 1978 and primary objectives were meet. The Rolling Airframe Missile Weapon System is currently (Sep 81) 28 months into Full Scale Engineering Development. During Full Scale Engineering Development two phase of Developmental Test and Evaluation are planned. Developmental Test-IIA began in May 1980 and will continue through May 1982. Developmental Test-IIA testing accomplished through December 1980 included 1 Control Test Vehicle fired at the Land Based Test Site to collect Flight engineering data on auto pilot instruments chosen for Full Scale Engineering Development baseline design; 3 Launch Test Vehicles fired at the Land Based Test Site to proof launcher, fiberglass canister, canister end cover and missile restraint design, to evaluate rocket motor blast effects and collect in-flight data on aerodynamic heating and vibration; and 1 week (85 runs) of overwater multipath testing against a stationary brassboard seeker at Pacific Missile Test Center to evaluate seeker performance and update the computer simulation multipath model. Testing from January 1981 through September 1981 included 2 Control Test Vehicles fired at the Land Based Test Site to proof rolling airframe autopilot design and capability to withstand high g maneuvers; 3 Guided Test Vehicles fired at the Land Based Test Site to evaluate the fiberglass launch canister and missile prelaunch, launch, target acquisition, handover and terminal functions as well as intercept assessment (all three Guided Test Vehicles impacted the targets); and airborne captive seeker tests to assess capabilities and limitations of the Full Scale Engineering Development guidance system against one or more targets in an overwater environment. The remainder of Developmental Test-IIA will consist of 23 Engineering Model missile firings from the Rolling Airframe Missile Weapon System at the Land Based Test Site and at sea to demonstrate the technical performance of the missile and operability of both the Rolling Airframe Missile System and its requisite support equipments. Further airborne captive-seeker testing will be conducted as well as testing for Radar-Electronics Support Measures correlation and various environmental evaluations. NATO SEA-SPARROW Surface Missile System Rolling Airframe Missile Ordnance Alteration development is in a deferred status. From October 1982 to April 1983 the second phase, Developmental Test-IIB, will be conducted with 32 prototype missiles in firings from the Land Based Tes Site and at-sea from the Rolling Airframe Missile Weapon System. These tests are to demonstrate compliance with the system specifications; obtain and assess prelifinary Reliability, Maintainability and Availability, human engineering, and Integrated Logistics Support data; and to verify system readiness for Operational Evaluation. Testing of initial production rounds and systems in Production Acceptance Test & Evaluation will verify production compliance with specifications.

Program Element: 64369N
DoD Mission Area: 231 - Anti-Air Warfare

Title: 5" Rolling Airframe Missile
Budget Activity: 4 - Tactical Programs

2. (U) Operational Test and Evaluation: No Operational Testing and Evaluation has been accommplished to date. Commander Operational Test and Evaluation Force monitored the program during Developmental Test-I and published an evaluation report providing an initial assessment of the Rolling Airframe Missile Weapon System. Within the limitations imposed by the fact that the evaluation was based on developmental testing only, Commander Operational Test and Evaluation Force concluded that the Rolling Airframe Missile Weapon System has potential for operational effectiveness and operational suitability, and recommended proceeding with Developmental Test-II. During Full-Scale Engineering Development, two phases of independent operational test and evaluation are planned. Operational Test-IIA is planned for 1982 and will provide an early evaluation of the system during development. Operational Test-IIA tests will consist of about 16 missile firings at a Land-Based Test Site and overwater. Operational Test-IIB (Operational Evaluation of Rolling Airframe Missile Weapon System) will be conducted in 1983 prior to the Milestone III decision to determine operational effectiveness and operational suitability. It will include about 26 missile firings at the Land-Based Test Site and at-sea. Land-Based Test Site tests will evaluate system performance primarily at short ranges and low-altitudes because of safety considerations in conducting such tests from manned ships. At-sea tests will be conducted in realistic combat scenarios using shipboard configurations operated by fleet personnel. Follow-on Test and Evaluation will be conducted on early production versions of the Rolling Airframe Missile Weapon System.

3. (U) Systems Characteristics:

Parameter	Threshold	Goal	Demonstrated
Frequency Spectrum			To be demonstrated in Operational Test-II and Operational Test-III
Accuracy			
Target Capacity			
Designation to 1st Missile Launch			
Cumulative Salvo Pk			
Minimum Range			
Maximum Range			
Low Altitude			

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64370N
Title: SSN 688 Class Vertical Launch System
DoD Mission Area: 232 - Amphibius, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Program

(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	8,916	37,486	35,362	26,830	52,174	160,768
S1500	SSN 688 Class Vertical Launch System	8,916	37,486	35,362	26,830	52,174	160,768
	(Quantity-TOMAHAWK Missiles)*						(4)
	(Quantity-Capsules)*						(13)

*Development/Operational Test and Evaluation

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will provide the SSN 719 and follow-on submarines of the SSN 688 Class with increased firepower. More specifically, it will provide the capability for the stowage and launch of twelve TOMAHAWK Cruise Missiles (in any one of its several land attack or anti-ship variants) from vertical missile tubes in the forward main ballast tank area of the submarine. This capability will greatly enhance the Navy's ability to counter the increasingly large Soviet surface naval forces as well as add to the U.S. total capability for land attack.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue fire control system modification development and fabricate hardware. Continue missile/capsule/ejection system full scale engineering development and prototype production. Conduct launch tests at Pop-Up Facility, San Clemente Island, California. Decrease in funding from FY 1982 to FY 1983 is due to program restructuring. 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 this Descriptive Summary are as follows: Decrease of 84 in FY 1981 for Presidential inflation reduction; decreases of 579 in FY 1982 and 6,793 in FY 1983 due to program restructuring. Total program increase is 27,459 due to aforementioned restructuring and more accurate estimates available as a result of FY 1981 engineering and planning efforts. The number of test items required for development/operational test and evaluation have been revised (-1 missile and +6 capsules) due to refinement of flight test program plans. Other Procurement, Navy: The backfit program has been accelerated by addition of FY 1982 funding (+16,699) for installation of the vertical launch capability during the FY 1985 overhauls of SSN 693 and SSN 694.

Program Element: 64370N
DoD Mission Area: 232 - Amphibius, Strike, Antisurface Warfare

Title: SSN 688 Class Vertical Launch System
Budget Activity: 4 - Tactical Program

The FY 1983 estimate has decreased by 45,100 by scheduling the SSN 719 and SSN 720 installations during initial construction (Shipbuilding and Conversion, Navy-funded), vice as overhaul backfits. As the complete schedule of overhaul backfits has not been determined, the total cost in this appropriation is shown as "to be determined". Shipbuilding and Conversion, Navy: All estimates in this appropriation are shown in the Selected Acquisition Report for the SSN 688 class.

(U) FUNDING 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	0	9,000	38,065	42,155	44,089	133,309
S1500	SSN 688 Class Vertical Launch System	0	9,000	38,065	42,155	44,089	133,309
	(Quantity-TOMAHAWK Missiles)*						(5)
	(Quantity-Capsules)						(7)

(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	-	-	16,699	14,713	*	*
(Quantity - Backfits)	(0)	(0)	(2)	(2)		

* To Be Determined

Program Element: 64370N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: SSN 688 Class Vertical Launch System
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Under other submarine-related research and development programs, the SSN 688 Class design was found to be amenable to the addition of twelve vertical missile tubes in the forward main ballast tanks without an increase in ship size or a detrimental effect on other ship operational capabilities. Each tube will contain an encapsulated TOMAHAWK Cruise Missile (in any one of its land attack or anti-ship variants) complete with its ejection mechanism. The missile capsule (providing missile ejection mechanism, shock mitigation, and environmental control) is a new development under this program. The TOMAHAWK Missile, as modified for vertical launch for surface ship vertical launch TOMAHAWK programs, will be used without further modification. The existing fire control system is utilized but with modifications to support vertical launch. Four TOMAHAWK missiles and 13 modified capsules will be procured for development/operational test and evaluation.

(U) RELATED ACTIVITIES: In FY 1982 the SSN 688 Class Vertical Launch System integration effort and shock testing will also be supported under Program Element 64567N, project S0857 (Ship Contract Designs). Other related programs include Program Element 64367N, project X0545, TOMAHAWK Missile Systems, and its related programs (e.g., Over-the-Horizon Targeting (Program Element 63530N); Attack Submarine Combat Control Systems Improvement Program (Program Element 64562N, project S0236.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Pacific Missile Test Center, Point Mugu, CA. Contractors: Westinghouse Electric, Sunnyvale, CA; McDonnell Douglas, St. Louis, MO; General Dynamics/Electric Boat Division, Groton, CT; General Dynamics/Convair, San Diego, CA; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; Singer Librascope, Glendale, CA; Aquidneck Data, Newport, RI; Newport News Shipbuilding, Newport News, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In FY 1980 the SSN 688 Class Vertical Launch System concept was developed under Program Element 64567N, Project S0857 (Ship Contract Design), Program Element 64562N, Project S0320 (Submarine Weapon Stowage and Launch) and Program Element 64367N, Project X0545 (TOMAHAWK Missile System). Initiated preliminary design of the vertical launch system. Initiated development of fire control system modifications. Initiated design of the vertically launched cruise missile/capsule/ejection system. In FY 1981, under the SSN 688 class Vertical Launch System project, design of the vertical launch system, continued development of fire control system modifications and continued design of the vertically launched cruise missile/capsule/ejection system. Prepared Test and Evaluation Master Plan.

2. (U) FY 1982 Planned Program: Conduct ship system integration studies. Continue fire control system modification development and missile/capsule/ejection system full scale engineering development and prototype production. Conduct launch tests at Pop-Up Facility, San Clemente Island, California. Conduct developmental shock test on Submarine Shock Test Vehicle. Initiate detail design of ship system using SCN funds.

Program Element: 64370N
Title: SSN 688 Class Vertical Launch System
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue fire control system modification development and fabricate hardware. Continue missile/capsule/ejection system full scale engineering development and prototype production. Conduct translator launch tests at Pop-Up Facility, San Clemente Island, California. The translator replace the originally planned ex-ballistic missile submarine for underwater launch testing to advance testing by one year. Decrease in funding from FY 1982 to FY 1983 is due to program restructuring.

4. (U) FY 1984 Planned Program: Complete fabrication of modified fire control system hardware. Complete prototype production of submarine launched cruise missiles/carsules. Conduct qualification shock tests on Submarine Shock Test Vehicle. Complete underwater demonstration Launches from translator at Pop-Up Facility, San Clemente Island, California. The decrease in the funding from FY 1983 to FY 1984 is due to a decrease in effort as the program progresses.

5. (U) Program to Completion: Complete development of modified fire control system software. Conduct test and evaluation of vertical launch missile/capsule/ejection system, modified fire control system and total vertical launch system.

6. (U) Milestones:

Milestone	Date
1. Start preliminary design	July 1980
2. Start combat control system modifications	July 1980
3. Issue requirements document	Nov 1980
4. Award capsule launcher subsystem contract	Jan 1981
5. Complete contract design	July 1981
6. Start ground launch tests	Sept 1981
7. Start detail design	Oct 1981
8. Award first ship contract modification	Dec 1981
9. Start underwater launch tests	Dec 1981
10. Start development shock test	July 1982
11. Start first ship installation	Sept 1982
12. Complete first ship installation	Dec 1985

Program Element: 64370N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: SSN 688 Class Vertical Launch System
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Functions/Mission Description: The SSN 688 Class Vertical Launch System will add an additional twelve TOMAHAWK All Up Rounds to the ship's weapon load by the addition of externally mounted vertical stowage tubes, without impact on the currently existing weapon capacity and capability. TOMAHAWK is a long range, low altitude cruise missile capable of nuclear or conventional attacks on land targets or conventional strikes against surface vessel targets. The total Vertical Launch System consists of an encapsulated TOMAHAWK All Up Round, Vertical Launch Ship Systems (including vertical stowage/launch tubes and other ship support systems), modifications to the Combat Control System MK 1 and All Up Round Loading/Shipping fixtures.

2. (U) Development Test and Evaluation:

a. (U) Naval Sea Systems Command will direct the planning for and the conduct of, all developmental testing, including Technical Evaluation. Commander Operational Test and Evaluation Force will provide independent assessment of Development Test and Evaluation and will direct the last portion, Operational Evaluation, of the Full Scale Engineering Development. Critical issues which will be addressed during Test and Evaluation include, but are not limited to: reliability, maintainability, availability, logistics supportability, compatability, Combat Control System interfaces, interoperability (including training, safety, security, human factors, transportability and counter detection).

b. (U) Development Test and Evaluation to Date: No significant government-funded Development Test and Evaluation of SSN 688 Class Vertical Launch System equipment has been scheduled or accomplished.

c. (U) Future Development Test and Evaluation:

(1) (U) Development Test I: No Demonstration and Validation Phase testing will be scheduled or accomplished as the program is to commence into the Full Scale Engineering Development (Phase II).

(2) (U) Development Test-IIA series Capsule Launcher Subsystem and All Up Round Full Scale Engineering Development (FY 1982-FY 1984) will include four phases of testing having purpose and objectives as indicated:

(a) (U) Development Test IIA-1A Scale Model Testing. (FY 1982) will obtain experience [redacted] from the launch tube and to assess the accuracy of the hydrodynamic characteristics used for the design and evaluation of the vertical launch TOMAHAWK system.

(b) (U) Development Test IIA-1B Capsule Launch Ground Qualification Tests. (FY 1982-FY 1983) will progressively verify design characteristics of Capsule Launch System components and the full scale Capsule Launch System. These tests are a precursor to the underwater launch demonstrations at San Clemente Island. Testing will verify resolution of technical risks and establish confidence that the Capsule Launch System will meet performance requirements.

(c) (U) Development Test IIA-1C [redacted] Launches. (FY 1982) will be the first underwater system level testing. The primary objectives are [redacted] performance and compatability of the Capsule Launch System/Launch vehicle with the vertical launch concept.

(d) (U) Development Test IIA-1C [redacted] Launches. (FY 1982-FY 1983) will be the second underwater system level testing and the first to demonstrate the feasibility of launching a TOMAHAWK cruise missile from an underwater vertical launch tube [redacted] on the missile and Capsule Launch System will be examined.) The data will verify the launch simulation models for the Capsule Launch Syster missile [redacted]

(e) (U) Development Test IIA-2 Underwater Full Scale Engineering Development Launch and Flight Demonstrations. (FY 1983-FY 1984) will demonstrate the physical and functional compatibility, interface, and operability of the integrated ship Missile Tube System and All Up Round/Capsule Launch System encapsulated missile, [redacted] for missile launch.

(3) (U) Development Test-IIB series Submerged Shock Test Vehcile Underwater Explosion Tests (FY 1982-FY 1984) will include tests having objectives as follows:

(a) (U) Development Test IIB-1 Submerged Shock Test Vehcile Underwater Explosion Development Tests. (FY 1982) will provide empirical data for correlation with the shock analysis methods being used for [redacted] and will provide early disclosure of risk.

(b) (U) Development Test-IIB-2 Submerged Shock Test Vehicle Underwater Explosion Qualification Tests. (FY 1984) will qualify the above equipment as a system [redacted] through underwater explosion demonstrations.

(4) (U) Development Test IIC-1 External Rotary Actuators Reliability and Qualification Tests. (FY 1982-FY 1983) will qualify the actuators for application in the attack submarine seawater environment and demonstrate capability to perform through life cycle ship usage to overhaul. [redacted]

Program Element: 64370N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: SSN 688 Class Vertical Launch System
Budget Activity: 4 - Tactical Programs

(5) (U) Development Test II-D Series Combat Control System MK 1 Tests. (FY 1983-FY 1984) will be conducted in conjunction with Chief of Naval Operations Project 234- (number to be assigned) The specific phases as they relate to the Vertical Launch System are: Development Test-IID-1 Combat Control System Hardware Qualification (FY 1983-FY 1984), Development Test-IID-2 Combat Control System Hardware Interface Testing (FY 1983-FY 1984), and Development Test-IID-3 Combat Control System Technical Evaluation. The primary objective of these tests is to certify that the Combat Control System MK 1 Hardware and Software unique to the Vertical Launch System are ready for shipboard installation and service use.

(6) (U) Development Test IIE Missile Tube System Prototype Tests. (FY 1983) will demonstrate the performance of the [ ] in accordance with the shipbuilding specifications as modified to reflect the Vertical Launch System and applicable weapon interfaces specified in the Vertical Launch System weapons system requirement document.

(7) (U) Development Test-IIF SSN 688 CLASS Vertical Launch System Technical Evaluation. [ ] will demonstrate that the Vertical Launch System is a fully operational system. The primary objective is to certify equipment readiness for Operational Evaluation.

(8) (U) Development Test-III Production Acceptance Test and Evaluation will demonstrate that the Vertical Launch System subsystem and components meet contract specifications and operational requirements for Navy acceptance by means of Factory Acceptance Tests, the Shipyard Installation Test and Trials Program, and Post Shipyard Test and Trials.

3. (U) Operational Test and Evaluation:

a. (U) Operational Test and Evaluation to Date: None

b. (U) Future Operational Test and Evaluation: None

(1) (U) Operational Test-I Testing · None will be scheduled or accomplished to be consistent with the Development Test and Evaluation Program.

(2) (U) Operational Test-IIA Vertical Launch System Hardware and Concept Testing (FY 1982-FY 1984) will independently evaluate the results obtained by and be concurrent with Development Test-IIA, IIB, IIC and IIE. The objectives of Operational Test-IIA will include, but not be limited to, generation of an early estimate of projected progress, identification of operational issues of Operational Test-IIC, and provide recommendation as to support for pilot production of the system and procurement of long lead time items for production systems.

Program Element: 64370N
DoD Mission Area: 232 - Amphibious, Strike, Antisurface Warfare

Title: SSN 688 Class Vertical Launch System
Budget Activity: 4 - Tactical Programs

(3) (U) Operational Test-IIB Combat Control System MK 1 Testing (FY 1984-FY 1989) will independently evaluate the hardware and software changes required of the combat control system to interface with and support the Vertical Launch System. This phase of testing will be more specifically addressed under Chief of Naval Operations Project 234- (number to be assigned) which will govern the overall Combat Control System changes in support of the Vertical Launch System and include other system enhancements as directed by the Chief of Naval Operations via the Software Configuration Control Board. Specific objectives of testing as they relate to the Vertical Launch Systen include, but are not limited to, verification of capabiliitiy to support the needs of the additional weapon capacity provided by the Veritical Launch System, verification that the Combat Systen performance has not been adversely affected by the addition of the Vertical Launch System, and assessment of the operational effectiveness and suitability of the Combat Control System hardware and software additions in support of the Vertical Launch Systems.

(4) (U) Operational Test-IIC Operational Evaluation [redacted] will monitor and independently evaluate the Development Test-IIF Vertical Launch System Technical Evaluation and independently conduct an at-sea operational evaluation of the Vertical Launch System. The primary objectives will be to evaluate Vertical Launch System operational effectiveness and operational suitability including adequacy of technical, tactical and training documentation; the effect of the Vertical Launch System on the SSN 688 Class sonar Figure of Merit; the capability of the ship to maintain positive ship control during multiple Vertical Launch System launches; and the capability of the Combat Control System to target all Vertical launch System weapons.

(5) (U) Operational Test-III [redacted] to be determined) is Follow-on Operational Test and Evaluation which will be conducted to evaluate corrective action on deficiencies identified in Operational Test-II, complete deferred or incomplete operational test and evaluation, continue tactical development, and provide for transition of testing to the fleet.

4. (U) SYSTEMS CHARACTERISTICS:

Operational	Threshold	Demonstrated Performance
Launch Speed	[redacted]	
Rate of Launch		
Reliability		

Note 1/: Nominal rate of launch. Exact times may vary. This includes the four ships Torpedo Tubes which are also capable of launching TOMAHAWK Cruise Missile.
Note 2/: Reliability definitions and quantitative values have not been defined for the SSN 688 Class Vertical Launch System.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64371N Title. HELLFIRE
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	0	0*	9,815	2,879	2,463	18,957**
W1415	HELLFIRE	0	0	9,815	2,879	2,463	18,957

* FY 1982 funding for HELLFIRE missile development is shown under PE 63313N Project W1415. $8,508 was provided with $3,800 intended for missile development and the balance for helicopter retrofit development.
** Includes $3,800 FY 1982 under PE 63313N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The HELLFIRE missile will significantly enhance the anti-armor capability of Marine Corps attack helicopters and increase survivability with the addition of a laser homing, fire-and-forget weapon.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue modifications required to make the missile shipboard compatible. Procure development and operational test and 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) FY 1982 HELLFIRE reported under PE 63313N.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: FY 1982 funding reported under PE 63313N.

(U) OTHER APPROPRIATIONS FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
WPN HELLFIRE	-	-	19,600	21,000	96,600*	TBD
Quantity			(195)	(227)	(1460)*	TBD

* Through FY 1987.

Program Element: 64371N Title: HELLFIRE
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: HELLFIRE is being developed under a modular missile concept for the US Army as the primary anti-armor missile for the Advanced Attack Helicopter, the AH-64. The Marine Corps has a similar requirement for such a weapon system for the AH-1T/J. With the HELLFIRE system the Marine Corps will have the ability to penetrate modern armor with minimum exposure of the launching platform to enemy counterfire. HELLFIRE will provide a laser homing, fire-and-forget capability against enemy armor that is currently lacking on Marine Corps attack helicopters.

(U) RELATED ACTIVITIES: HELLFIRE Missile: 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: HELLFIRE Missile; In-House: Naval Weapons Center, China Lake, CA. Contractors: Rockwell International, Columbus, OH.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: None. This is a FY 1982 new start.

2. (U) FY 1982 Program: Reported under PE 63313N for FY 1982. Initiate development of arm and fire device for the rocket motor. Conduct safety assessment. Conduct electromagnetic interference testing and identify required modifications. Study warhead explosive characteristics and identify problem areas.

3. (U) FY 1983 Planned Program: Continue modifications to the basic U. S. Army developed missile to make it shipboard compatible. Procure development and operational test and evaluation hardware.

4. (U) FY 1984 Planned Program: Complete necessary modifications. Conduct Development Test and Evaluation on the AH-1J and AH-1T. Conduct Operational Test and Evaluation on the AH-1J aircraft. Obtain Approval for Service on the AH-1J/HELLFIRE weapon system.

5. (U) Program to Completion: Conduct Operational Test and Evaluation for the AH-1T aircraft. Obtain Approval for Service Use on the AH-1T/HELLFIRE weapon system.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64372N
Title: New Threat Upgrade
DoD Mission Area: 231 - Anti-Air 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	34,149*	38,250*	41,8F1	41,598	Continuing	Continuing
S0188	New Threat Upgrade	25,282*	23,521*	23,740	29,783	Continuing	Continuing
S0964	TARTAR SM-2/New Threat Upgrade	8,867*	14,729*	18,141	11,815	Continuing	Continuing

* S0188 and S0964 - funded in program element 64352N Surface-Launched Weaponry/Ship Systems prior to FY 1983.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports development of shipboard missile systems to counter major and projected anti-ship missile threats. It encompasses improvements to the tactical TERRIER and TARTAR systems found on our guided missile cruisers and destroyers. Significant improvements are required to the detection systems, sensor data processing and the weapons engagement system to meet the projected threat. These improvements involve the AN/SPS-48E three dimensional radar, Navy Tactical Data System/Weapons Direction System software changes, AN/SYS-2 Integrated Automatic Detection and Tracking System and the AN/SPS-49(V)5 two dimensional air search radar. Project S0188 New Threat Upgrade develops the improved combat system for twenty-two of our TERRIER guided missile cruiser and destroyers. Project S0964 adopts STANDARD Missile-2 Block I and STANDARD Missile-2 Block II/New Threat Upgrade improvements for ten of our TARTAR guided missile cruisers (CGNs) and guided missile destroyers (DDG-993 Class).

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0188 - New Threat Upgrade (TERRIER): Continue integrated combat system testing and correct deficiencies identified as a result of at-sea test and evaluation program. De-installation of special instrumentation placed onboard DDG 42 for technical and operational tests. Complete planning for initial New Threat Upgrade Combat System Production installation for lead production ship (CG 31) and the designated initial training facility. Complete test and evaluation, data reduction and analysis and continue development of software and related documentation required to incorporate "lessons learned" prior to shipboard integration of New Threat Upgrade Combat System Suites for follow-on production ships. Project S0964 - TARTAR SM-2/New Threat Upgrade: Integrate the MK 74 Fire Control System modifications with the Radar Data Processor computer program and certify the program. Certify the weapons direction system, downlink system, and combat direction system program. Begin development of modifications to provide compatibility with New Threat Upgrade sensor systems and STANDARD Missile-2, Block II. An increase of $3,412 thousand is reflected between FY 1982 and FY 1983 as a result of a decision to transfer OPN funds associated with special purpose computer software development and documentation. 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.

Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title. New Threat Upgrade
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: Project S0188 New Threat Upgrade - an increase in FY 1981 of $7,800 to reflect an approved Congressional reprogramming to provide for cost growth and scope increase to maintain schedule and an increase of $3,000 in FY 1982 due to Congressional addition in the Appropriation Bill to accelerate the program, a decrease of $110 in FY 1981 and $26 in FY 1982 for inflation adjustment. Project S0964 TARTAR SM-2/New Threat Upgrade: FY 1981 reflects a $715 increase caused primarily by a reprogramming to cover increased costs. In FY 1982 reflects a decrease of $18 for inflation reduction.

(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*	25,510	25,744	35,294	TBD	Continuing	Continuing
S0188	CG/SM-2/New Threat Upgrade	17,214	17,592	20,547	TBD	Continuing	Continuing
S0964	TARTAR SM-2/New Threat Upgrade	8,296	8,152	14,747	TBD	Continuing	Continuing

* S0188 and S0964 - funded as part of Program Element 64352N Surface-Launched Weaponry Ship Systems Program prior to 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
S0188	OPN SHS ORDALTS AREA DEFENSE TERRIER (Includes TERRIER CG/SM-2 and New Threat Upgrade)	75,727	49,908	51,673	91,333	Continuing	Continuing
S0964	OPN (TARTAR CGN/SM-2 Upgrade)	7,226	21,730	25,063	25,305	303,453	382,777

Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title: New Threat Upgrade
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for major improvements to existing TERRIER and TARTAR surface missile systems to eliminate weaknesses in system effectiveness to counter Anti-Ship Missile threats. Project S0188 New Threat Upgrade provides significant improvements to the baseline TERRIER CG/SM-2 System to engage the most severe threats by adding more improvements to the search radars, automatic target detection and track, and integration with the STANDARD Missile-2 Block-II. Project S0964 TARTAR STANDARD Missile-2 New Threat Upgrade will provide New Threat Upgrade type capabilities to the 10 CGN/DDG-993 TARTAR ships.

(U) RELATED ACTIVITIES: Standard Missile Improvements, PE 64366N, Surface Missile Warhead Development, PE 64365N, Radar Surveillance Equipment (Engineering), PE 64508N.

(U) WORK PERFORMED BY: In-House: Naval Avionics Facility, Indianapolis, IN; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Naval Surface Weapon Center, Dahlgren, VA; Naval Ship Weapon Systems Engineering Station, Pt. Hueneme, CA. Contractors: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; Automation Industries, Inc., Vitro Laboratories, Silver Spring, MD; Raytheon, Wayland, MA; Sperry Rand, Great Neck, NY; General Dynamics, Pomona, CA, Northern Ordnance Corp., Minneapolis, MN, Electronics Communications Inc., St. Peterburg, FL; UNIVAC, Minneapolis, MN; ITT Gilfillan, Van Nuys, CA.; Sperry Gyroscope Division of Sperry Rand Corporation, Great Neck, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0188 New Threat Upgrade: Completed specific design tasks that defined required improvements to search radars[ ]and other associated system modifications to enable engagement of[ ]anti ship missiles. Completed detailed equipment and computer program design and commenced coding/debugging and testing of computer programs. Completed fabrication and commenced factory tests of all subsystem modifications. Commenced installation of modification kits at land based test site. Initiated combat systems integration. Completed factory acceptance testing of all subsystem modifications. Completed subsystem modification installation and continued integration testing at land based test sites. Continued land based test site acceptance testing of all computer programs. Continue land base test site evaluation of weapons control and surveillance systems. Completed planning and design for shiboard installation test and evaluation. Project S0964 TARTAR STANDARD Missile-2 New Threat Upgrade: A new start in FY 1979, developed the system requirements and specifications for the CGN TARTAR STANDARD Missile-2 baseline. Completed interface design specifications. Continued development of software design specifications. Acquisition plan completed and approved. Test and Evaluation Master Plan approved. Began design of TARTAR CGN STANDARD Missile-2, Block I, capability for CGN-38 Class. Continued design of computer programs for TARTAR CGN STANDARD Missile -2, Block I, capability for CGN-38 Class. Prepared Land Based Test Site for software certification.

Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title: New Threat Upgrade
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Project S0188 - New Threat Upgrade: Complete land based test site evaluation. Complete installation of sub-system modification and computer programs in test ship (USS MAHAN). Conduct at sea Technical and Operational Evaluation. Project S0964 TARTAR STANDARD Missile-2 New Threat Upgrade: Begin computer program testing. Prepare land based test sites for Weapon Direction System software certification. Begin Standard Missile 2 Block I program testing.

3. (U) FY 1983 Planned Program: Project S0188 New Threat Upgrade: Correct any discrepancies or deficiencies resulting from at-sea test and evaluation. Commence procurement of limited production systems for TERRIER ships/trainers. Project S0964 TARTAR STANDARD Missile-2 New Threat Upgrade: Perform system integration and certification at the land based site for STANDARD Missile-2, Block I. Begin development of modifications to provide compatibility with New Threat Upgrade Sensor Systems and STANDARD Missile-2, Block II.

4. (U) FY 1984 Planned Program: Project S0188 New Threat Upgrade: Correct any deficiencies resulting from at-sea test and evaluation. Commence full scale production. Continue development of computer software and documentation. Project S0964 - TARTAR STANDARD Missile-2/New Threat Upgrad: Continue development of weapon systems modifications to provide compatibility with Standard Missile 2 Block II. Continue work on computer software to resolve problems uncovered at Land Based Test Site testing.

5. (U) Program to Completion: Project S0188 New Threat Upgrade: Continue efforts as necessary to update systems to meet the changing threats. Continue full scale production of New Threat Upgrade system modifications for selected TERRIER ships. Project S0964 TARTAR CGN New Threat Upgrade: Complete system hardware and computer program design and test the complete New Threat Upgrade-Block II capability for CGN-38, DDG-993 and CGN-36 Classes. Evaluate at sea for each class of ships.

6. (U) Milestones:

Milestones	Date
1. Complete Land Based Testing of the TERRIER/New Threat Upgrade System	November 1981
2. Provisional Approval for Service Use of TERRIER/New Threat Upgrade System and Limited Production	
3. Approval for Service Use of TERRIER/New Threat Upgrade	
4. First TARTAR - New Threat Upgrade Installation	

Project: S0188
Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title: New Threat Upgrade
Title: New Threat Upgrade
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project supports development of modifications to the base line TERRIER CG/SM-2 Combat System design to counter advanced air-to-surface missile threats. The New Threat Upgrade Combat System includes consideration of [redacted] The CG/SM-2 combat system provides area defense capability against these threats. Significant improvements are required in detection systems, sensor data processing and the weapon engagement system. These improvements involve the AN/SPS-48E Three Dimensional Radar, Navy Tactical Data System/Weapons Direction System software changes, AN/SYS-2 Integrated Automatic Detection and Tracking System and its interfaces with the AN/SPS-48E and AN/SPS-49 Radars.

(U) RELATED ACTIVITIES: PE 64366N, STANDARD Missile-2 Improvements; PE 64508N, Radar Surveillance Equipment.

(U) WORK PERFORMED BY: In House: Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA: Naval Surface Weapons Center, Dahlgren, VA: Fleet Combat Direction Systems Support Activity, Dam Neck, VA. Contractors: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD; Automation Industries, Inc., Vitro Laboratories, Silver Spring, MD; Raytheon, Wayland, MA; Sperry Corp., Sperry Gyroscope Division, Great Neck, NY; Northern Ordnance Corp., Minneapolis, MN; International Telephone and Telegraph, Gilfillan, Van Nuys, CA; United Technologies Inc., Norden Systems, Norwalk, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The TERRIER New Threat Upgrade Weapon System was developed under Program Element 64352N Surface Launched Weaponry/Ship Systems in FY 1982 and prior years. System design studies to address the deficiencies in the CG/SM2 Combat System were defined and completed. Completed specific design tasks that defined required improvements to the 3-dimensional search radar for detecting targets [redacted] requirements for integrated automatic processing of target data from all available sources to maintain engagement of specified threats throughout their flight profile; improved Electronic Countermeasures resistance of ship/missile communication links; and adaptation of command and control and weapon control systems to handle the threat. Completed detailed equipment and computer program designs and completed fabrication and commenced factory tests of all subsystem modifications. Initiated combat system integration including interface definition and design modifications to the baseline TERRIER CG/SM-2 Combat System. Commenced preparation of land based test site for incremental testing up to the combat system level. Completed definition of reliability, maintainability, and availability requirements, and commenced design analysis and data collection for these requirements. Commenced coding/debugging of computer programs and commenced acceptance tests at contractor sites. Commenced installation and checkout of sub-system modificaton kits at land based test site. Initiated detailed planning and design for shipboard testing of all sub-system modifications and for operational evaluation of New Threat Upgrade Combat System. Completed factory acceptance testing of all sub-system modifications. Completed sub-system testing at land based test site.

Project: S0188 — Title: New Threat Upgrade
Program Element: 64372N — Title: New Threat Upgrade
DoD Mission Area: 231 - Anti-Air Warfare — Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Complete land based test site acceptance testing of all computer programs. Complete land based test site evaluation of weapon control and surveillance systems. Complete land based test site evaluation of composite combat system. Complete planning and design for shipboard installation test and evaluation. Continue design analysis and data collection for reliability and maintainability requirements. Complete land based test site evaluation of New Threat Upgrade Combat System. Complete installation of sub-system modifications and computer programs in the test ship (USS MAHAN DDG 42). Perform at-sea tests (Technical/Operational Evaluation) to obtain satisfactory performance data to support recommendation for Approval for Service Use.

3. (U) FY 1983 Planned Program: Obtain Approval for Service Use based on satisfactory completion of at-sea tests. Commence procurement of (limited) production New Threat Upgrade Combat System for lead production ship (CG 31) and designated initial trainer sites. Complete test and evaluation data reduction and analysis required to incorporate lessons learned for production ships. Continue development of special purpose computer software and related documentation

4. (U) FY 1984 Planned Program: Correct any deficiencies resulting from at-sea test and evaluation. Commence procurement of (full) production systems for TERRIER ship/trainers. Continue development/adaptation of special purpose computer software and related documentation for production New Threat Upgrade ship systems.

5. (U) Program to Completion: Continue effort to update systems to meet the changing threats and provide greater tactical flexibility to employ installed systems. Contnue full scale production of New Threat Upgrade system modifications for selected TERRIER ships. Continue development/adaptaton of special purpose computer software and related documentation.

6. (U) Milestones:

	Milestone	Date
1.	Complete Land Based Combat System Integration Testing	Nov 81
2.	Complete at-sea testing (Technical Evaluation - Phase I)	
3.	Complete at-sea testing (Operational Evaluation - Phase I)	
4.	Limited Production Decision	
5.	Full Production Decision	

Project: S0188
Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title: New Threat Upgrade
Title: New Threat Upgrade
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 Estimaced Cost
S0188	New Threat Upgrade	25,282*	23,521*	23,740	29,783	Continuing	Continuing

* Funded in Program Element 64352N Surface Launched Weaponry/Ship Systems prior to FY 1983.

Project: S0964
Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title: TARTAR SM-2/New Threat Upgrade
Title: New Threat Upgrade
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: TARTAR Cruisers and DDG-993 Class Destroyers constitute the newest Fleet members to provide defense against the Anti Air Warfare threat of the future. These ships have the sophisticated detection and command and control systems required to support advanced missile systems now being proven in the CG/SM-2 program and being introduced in to the TERRIER Cruisers. These system improvements are available for incorporation into the TARTAR Cruisers in an orderly and low risk upgrade. In addition, developments within the New Threat Upgrade project will be introduced to this program as they are completed. The equipments involved are the Weapons Directed System MK 14, the AN/SPS-48E three dimensional radar, the AN/SPS-49(V)5 automatic detect and track radar, the AN/SYR-1 downlink system, the AN/SYS-2 Integrated Automatic Detection and Tracking System, and the radar data processor to be incorporated in the TARTAR-D Missile Fire Control System MK 74.

(U) RELATED ACTIVITIES: Standard Missile Improvements, PE 64366N, Radar Surveillance Equipment (Engineering), PE 64508N, STANDARD Missile Improvements PE 64366N.

(U) WORK PERFORMED BY: In House: Naval Surface Weapons Center, Dahlgren, VA; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Naval Ship Weapons Systems Engineering Station, Pt. Hueneme, CA. Contractors: Applied Physics Laboratory, Johns Hopkins University, Laurel, MD is the system integration coordinator. Other Contractors involved are: Automation Industries/Virto Labs, Silver Spring, MD, Raytheon, Wayland, MA, ECI, St. Petersburg, FL; UNIVAC, Minneapolis, MN, Northern Ordnance, Minneapolis MN, and General Dynamics, Pomona, CA; Sperry Gyroscope Division of Sperry Rand Cooperation, Great Neck, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: System requirements and specifications for the TARTAR CGN STANDARD Missile-2 Upgrade were developed. Established the ship Anti Air Warfare system configuration and completed the interface design specifications to support system requirements. Completed development of software performance specification. Completed Ordnance Alteration development for initial system design to incorporate STANDARD Missile-2 Block I capability into CGN-38. Continued software design. Issued program performance specifications, defined simulation requirements and developed plans for a land based test site. STANDARD Missile-2, Block I, Phase I includes the modifications necessary to incorporate the STANDARD Missile-2 into the weapon system. It involves the Weapon Direction System MK 14, the AN/SYR-1 Down Link System, modifications to the Combat Direction System, and the MK 74 Missile Fire Control System and the Guided Missile Launching System MK 26 and MK 13. Continued preparation of the land based test site for software certification. Phase II incorporates the STANDARD Missile-2 Block II missile and improvements being developed in the TERRIER New Threat Upgrade Program.

2. (U) FY 1982 Program: Begin STANDARD Missile-2, Block I, program testing. Prepare land based test sites for Weapons Direction System Fire Control, and SYR-1 software certification.

Project: S0964
Program Element: 64372N
DoD Mission Area: 231 - Anti-Air Warfare

Title: TARTAR SM-2/New Threat Upgrade
Title: New Threat Upgrade
Budget Activity: 4 - Tactical Program

3. (U) FY 1983 Planned Program: Integrate the MK 74 Fire Control System modification with the radar data processor compute. program and certify the program. Certify the weapons direction system, downlink system, and combat direction system programs. Begin development of modifications to provide compatibility with New Threat Upgrade sensor systems and STANDARD Missile-2, Block II.

4. (U) FY 1984 Planned Program: Continue the development of modifications to provide compatability with New Threat Upgrade sensor system and Standard Missile-2, Block II. Resolve computer program software problems generated by testing at Raytheon Land Based Test Site FCDSSA Land Based Test Site and ICSTF.

5. (U) Program to Completion: Perform certification and system integration at the land based test site for the New Threat Upgrade and STANDARD Missile-2 Block II capability. Develop additional computer programs and hardware to integrate the New Threat Upgrade and STANDARD Missile-2 Block II capability. Perform software design and test to provide the full up STANDARD Missile-2 Block II capability in TARTAR CGN-36, CGN-38 and DDG-993 Classes.

6. (U) Milestones:

Milestones	Date
1. Program Certification	
2. CGN-38 SM-2 Installation	
3. CGN-40 New Threat Upgrade Installation	
4. SM-2 Follow-on Test and Evaluation	
5. New Threat Upgrade Follow-on Test and Evaluation	

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0964	TARTAR SM-2/New Threat Upgrade	8,867	14,729	18,141	11,815	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64502N
Title: Submarine Communications
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	8,353	7,187	5,584	8,314	Continuing	Continuing
X0742	Submarine Integrated Antenna System	8,353	7,187	5,584	8,314	Continuing	Continuing
	(Mast/Periscope Mounted Systems)	(336)	(600)	(800)	(1,400)	(Continuing)	(Continuing)
	(Quantity - Service Test Models: AN/BRA-34						(1)*
	OE-158/BRQ)						(1)*
	(AN/BSQ-5 Towed Buoy and Related Improvements)	(5,092)	(3,625)	(2,100)	(2,150)	(Continuing)	(Continuing)
	(Quantity - Advanced Development Model						(1)*
	- Service Test Models)						(3)**
	(Buoyant Cable System Improvements)	(383)	(525)	(600)	(700)	(Continuing)	(Continuing)
	(Quantity - Engineering Development Models)						(2)***
	(Quantity - Service Test Models)						(2)**
	(Expendable Buoy Systems)	(1,187)	(1,187)	(1,008)	(800)	(Continuing)	(Continuing)
	(Quantity - Ultra High Frequency Satellite Communi-						
	cations Buoys Engrg. Devel. Models)						(150)**
	(Antenna Signal Distribution Systems)	(350)	(250)	(150)	(1,100)	(Continuing)	(Continuing)
	(Other Sub-tasks)	(1,005)	(1,000)	(926)	(2,164)	(Continuing)	(Continuing)

* Procured prior to FY 1981
** Developmental/Operational Test and Evaluation
*** Material Procurements for In-house Assembly; Developmental/Operational Test and Evaluation

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Submarine Integrated Antenna Systems is a program to provide attack submarines with the required antenna systems to support multifunction information exchange capabilities (communications, navigation, identification with aircraft, ships, other submarines and shore stations in support of submarine warfare operational doctrines). Particular emphasis is being placed on the role of the systems for attack submarines in the Direct Support mission. Information exchange is required from operational depths with minimum restriction on speed, depth, and maneuverability. Several generic types of submarine antenna systems must be integrated and balanced to provide operational flexibility, enhanced functional capabilities, and redundancy, while optimizing the use of limited budget resources, and finite submarine space and weight. Developments in this

Program Element: 64502N
DoD Mission Area: 345 - Tactical Communications

Title: Submarine Communications
Budget Activity: 4 - Tactical Programs

program, both present and/or proposed, are as follows: (a) mast/periscope mounted systems; (b) towed buoy systems; (c) buoyant cable systems; (d) expendable buoy systems; (e) antenna signal distribution systems; and (f) systems engineering/planning, including Submarine Advanced Combat System concepts/requirements. The Submarine Integrated Antenna Systems program is a continuing program to provide present and future nuclear attack submarines with service approved antenna sytems in the earliest time frame. Navy Decision Coordinating Paper X-0742-CC (Revision 1) of 3 March 1980 approved the planned development effort.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue the demonstration and validation phase for providing the AN/BRA-34 antenna with a high frequency limited range intercept capability and continue the development to provide both the AN/BRA-34 and the OE-158/BRO antennas with a NAVSTAR Global Positioning System reception capability. Initiate demonstration/validation phase to provide the AN/BRA-34 antenna with a high frequency (wideband) transceive capability. Fabricate an antenna for incorporation in the attack submarine type 18 attack periscope which will provide a Submarine Satellite Information Exchange receive capability and conduct initial testing. Conduct technical evaluation and operational evaluation of the AN/BSQ-5 towed buoy service test models installed in FY 1982 on a 637 and a 688 class submarine. Continue factory reliability/maintainability testing and operational training with the third AN/BSQ-5 Service Test Model. Continue development efforts to provide improved towed buoy hydrodynamic performance as well as additional electronic capabilities. Obtain approval for service use of the Ultra High Frequency Satellite Communications expendable buoy system to provide attack submarines with a one-way Submarine Satellite Information Exchange System transmission capability. Continue system engineering efforts in support of advanced communication techniques and in support of the Submarine Advanced Combat System. The FY 1983 estimate decreased by $1,603 thousand from the FY 1982 funding estimate due to stretching out development efforts for improvement of existing and delaying initiation of new programs. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phses 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) The FY 1981 and FY 1982 RDT&E funding has decreased by 151 and 316 respectively due to inflation adjustment. (2) A decrease of 2,279 in FY 1983 was due to a funding reduction to delay program initiations and extend ongoing programs.

Program Element: 64502N
DoD Mission Area: 345 - Tactical Communications
Title: Submarine 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	9,316	8,504	7,503	7,854	Continuing	Continuing
X0742	Submarine Integrated Antenna System	9,316	8,504	7,503	7,854	Continuing	Continuing
	(Mast/Periscope Mounter Systems)	(540)	(536)	(700)	(800)	(Continuing)	(Continuing)
	(Quantity - Service Test Models - AN/BRA-34 OE - 158/BRQ)						(1)3/ (1)3/
	(AN/BSQ-5 Towed Buoy and Related Improvements)	(5,864)	(4,988)	(2,847)	(2,644)	(Continuing)	(Continuing)
	(Quantity - Advanced Development Model - Service Test Model)	1/					(1)3/ (4)4/
	(Buoyant Cable System Improvements)	(190)	(423)	(550)	(600)	(Continuing)	(Continuing)
	(Quantity - Engineering Development Models)	2/					(2)
	(Quantity - Service Test Models)		1/				(2)
	(Expandable Buoy Systems)	(1,595)	(1,207)	(850)	(850)	(Continuing)	(Continuing)
	(Quantity - Ultra High Frequency Satellite Communications Buoys Service Test Models)	1/					(150)
	(Antenna Signal Distribution Systems)	(225)	(350)	(700)	(1,000)	(Continuing)	(Continuing)
	(Other Sub-Tasks)	(902)	(1,000)	(1,856)	(1,960)	(Continuing)	(Continuing)

1/ Development/Operational Test and Evaluation.
2/ Material Procurements for In-House Assembly; Development/Operational Test and Evaluation.
3/ Procured Prior to FY 1980.
4/ One of four units was procured prior to FY 1980.

(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 (Various Items)	6,411	5,714	9,674	11,232	Continuing	Continuing

Program Element: 64502N
Title: Submarine Communications
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Submarine Integrated Antenna Systems program developments include: (a) mast/periscope mounted systems which combine several antenna functions into a single antenna for operation at periscope depth; (b) towed buoy systems which provide for information exchange (communications, navigation, identification) at higher speeds/deeper depths via a buoy lift body that is towed near the surface; (c) buoyant cable systems which provide for information exchange with the submerged submarine via buoyant transmission line having an antenna section floating at or near the surface; (d) expendable buoy systems which are launched from the submarine signal ejector tube to provide one-way information transfer; (e) antenna signal distribution systems to permit optimum signal distribution between the attack submarine antenna systems and in-hull receivers and transmitters; and (f) the associated systems engineering/planning necessary to effectively implement the above systems, including analysis of Submarine Advanced Combat System concepts/requirements.

(U) RELATED ACTIVITIES: Program Element 62721N, Command and Control Technology, provides submarine communications technology support in radio frequency and optical communications. The Attack Submarine Integrated Communications System program (project X1411 of Program Element 64524N) interfaces with this program including implementation of the High Frequency Improvement Program. Program Element 11228N, TRIDENT Submarine System utilizes similar technology to develop multifunction mast antennas and towed communication buoys. Program Element 11402N, GRYPHON, utilizes similar technology in the development of towed communication buoys and an improved standardized buoyant cable antenna system for fleet ballistic missile submarines. Development of compatible attack submarine antennas is required by the NAVSTAR Global Positioning System program (Program Element 63401N). The Submarine Advanced Combat System (Project S1347 of Program Element 64524N) provides for development of an integrated combat system for future classes of submarines, of which the antennas being developed under the Submarine Integrated Antenna Systems program will be a part.

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT; Naval Research Laboratory, Washington, D.C.; David W. Taylor Naval Ship Research and Development Center, Bethesda and Annapolis, MD; Naval Sea Systems Command, Washington, D.C.; Naval Ship Systems Engineering Station, Philadelphia, PA; Contractors: Spears Associates, Norwood, MA; International Telephone and Telegraph Corporation, Nutley, NJ; Hazeltine Corporation, Braintree, MA; Computer Sciences Corporation, Falls Church, VA; Booz, Allen and Hamilton, Incorporated, Bethesda, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Multifunction mast antenna (AN/BRA-34) service test model was fabricated and a Technical Evaluation/Operational Evaluation was performed in FY 1974 and FY 1975; approval for service use was granted in FY 1976. Multifunction mast antenna (OE-158/BRQ) service test model, to be used as an interim Submarine-to-Satellite Information Exchange System antenna on SSN-637 class submarines was fabricated and a Technical Evaluation and Operational Evaluation was completed in FY 19TQ. AN/BSQ-5 towed buoy advanced development model was fabricated and tested at-sea on USS POGY (SSN-647). AN/BSQ-5 engineering development model towed buoy fabrication was initiated in FY 1974. A fairing for the advanced high speed buoy tow cable was evaluated at sea in FY 1976 and the design of a new winch and ancillary equipment initiated in FY 19TQ. A one-way, Very

Program Element: 64502N Title: Submarine Communications
DoD Mission Area: 345 - Tactical Communications Budget Activity: 4 - Tactical Programs

High Frequency expendable buoy (AN/BRT-1) was fabricated, successfully completed technical/operational evaluation, and approved for service use in 1973. The antenna System Readiness Monitor for AN/BRA-34 was designed, fabricated and tested at sea. Completed redesign of AN/BRA-24A cable transfer mechanism for buoyant cable antennas. Completed technical and operational evaluation of the OE-176/BR , SSN 594 class mast mounted antennas. Installed the AN/BSQ-5 towed buoy engineering development model on USS RICHARD B. RUSSELL (SSN 687) and conducted at-sea testing. Conducted demonstration and validation efforts for an improved towed buoy in the areas of receivers, buoy electronics, and antennas. Conducted tow cable strength and corrosion tests. In FY 1980, completed demonstration and validation phase of an ultra high frequency satellite communications expendable buoy, conducted successful transmission, and awarded contract for procurement of engineering development models. Completed ultra high frequency satellite communications expendable buoy engineering development model design in FY 1981 and commenced testing. Completed fabrication in FY 1980 of a feasibility model to provide ocean wave compensation "autotune" capability to the AN/BRA-34 mast antenna and conducted initial testing in FY 1981. Continued fabrication in FY 1981 of three AN/BSQ-5 towed buoy service test models. Both the OE-176 and the OE-158 mast mounted antennas were approved for service use in FY 1980. Completed design and fabrication of dump lift mechanism for improved towed buoy in FY 1981. Successfully transmitted and received with the Submarine Satellite Information Exchange System at sea in FY 1981 using the AN/BSQ-5 towed buoy system on USS RUSSELL.

2. (U) FY 1982 Program: Complete demonstration and validation development phase of the AN/BRA-34 autotune (ocean wave compensation) capability. Continue demonstration and validation of electronic design improvements to AN/BRA-34 mast mounted antenna to achieve a high frequency, limited range intercept capability. Evaluate International Telephone and Telegraph designed NAVSTAR Global Positioning System modification to AN/BRA-34 antenna. Continue demonstration and validation efforts to provide the OE-158/BRQ mast mounted antenna with a reception capability for NAVSTAR Global Positioning System. Develop advanced development model specifications for a Type 18 periscope antenna for reception of ultra high frequency satellite communications. Complete fabrication and deliver three AN/BSQ-5 towed buoy service test models. Install one AN/BSQ-5 on a 637 class attack submarine, one on a 688 class attack submarine and initiate at-sea testing. Conduct factory reliability/maintainability testing and operational training with the third AN/BSQ-5 Service Test Model. Efforts to provide electronic improvements to an AN/BSQ-5 basic configuration design will be continued with various capability developments transitioning from demonstration and validation into full scale development. Demonstration and validation efforts will continue to provide improved hydrodynamic performance through development of a new buoy body and a larger diameter tow cable for reduced drag at higher speeds, transitioning to full-scale development in the fourth quarter of FY 1982. Continue full-scale development of standardized buoyant cable antenna system and conduct technical evaluation. Initiate development of an improved buoyant cable handling system to replace the existing AN/BRA-24( ). Continue full-scale development of an ultra high frequency satellite communications expendable buoy and conduct technical evaluation and operational evaluation. Under the category of systems engineering/planning, program initiation efforts will be pursued to support emerging information exchange systems, the Submarine Advanced Combat System, the High Frequency Improvement Program and far term towed buoy concepts. Develop specifications for an Antenna Signal Distribution System for the 637 class submarine.

Program Element: 64502N
DoD Mission Area: 345 - Tactical Communications

Title: Submarine Communications
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue the demonstration and validation phase for providing the AN/BRA-34 antenna with a high frequency limited range intercept capability and continue the development to provide both the AN/BRA-34 and the OE-158/BRQ antennas with a NAVSTAR Global Positioning System reception capability. Initiate demonstration/validation phase to provide the AN/BRA-34 antenna with a high frequency (wideband) transceive capability. Fabricate an antenna for incorporation in the attack submarine Type 18 attack periscope which will provide a Submarine Satellite Information Exchange System receive capability and conduct initial testing. Conduct technical evaluation and operational evaluation of the AN/BSQ-5 towed buoy service test models installed in FY 1982 on a 637 and a 688 class submarine. Continue factory reliability/maintainability testing and operational training with the third AN/BSQ-5 Service Test Model. Continue development efforts to provide improved towed buoy hydrodynamic performance as well as additional electronic capabilities. Obtain approval for service use of the standard buoyant cable antenna system and continue development of an improved Standard Buoyant Cable Antenna System handling system. Obtain approval for service use of the ultra high frequency satellite communications expendable buoy system to provide attack submarines with a one-way Submarine Satellite Information Exchange System transmission capability. Continue system engineering efforts in support of advanced communication techniques and in support of the Submarine Advanced Combat System. Decrease of $1,603 thousand from FY 1982 to FY 1983 is due to stretchouts in most sub-tasks.

4. (U) FY 1984 Planned Program: Continue development of automatic (ocean wave compensation) tuning capability for the AN/BRA-34 antenna and commence development of new control unit. Commence full-scale development of high frequency limited range intercept capability for the AN/BRA-34 antenna and continue high frequency (wideband) development efforts for incorporation in that antenna. Continue efforts to implement NAVSTAR Global Positioning System and Joint Tactical Information Distribution System in both the AN/BRA-34 and OE-158/BRQ antennas. Obtain Approval for Service Use for the AN/BSQ-5. Continue the AN/BSQ-5 improvement program development in both hydrodynamic and electronic areas. Continue development of AN/BRA-24( ) design improvements and initiate demonstration/validation phase of a buoyant cable Deploy/Retrieve/Storage System for far-term installation on submarines. Award production contract for the ultra high frequency satellite communications expendable buoy. Support the Submarine Advanced Combat System with antenna development efforts as required. Continue development of the Antenna Signal Distribution System for the 637 class submarine.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64503N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Development (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	32,026	40,403	41,779	36,583	Continuing	Continuing
S0219	Submarine Sonar Improvements	32,026	40,403	41,779	36,583	Continuing	Continuing
	(Sub-Tasks: Quintities)*	(*)	(*)	(*)	(*)	(*)	(*)

(* Sub-Tasks and Quantities are too numerous to tabulate)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program encompasses engineering development of attack submarine sonar improvements in order to maintain an acoustic advantage over new quieter Soviet subsarines. Currently, effort within this element is directed primarily toward development of improvements for the AN/BQQ-5 sonar and integration of attack submarine acoustic equipments, applicable to SSN 594/637/688 Classes.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The FY 1983 funds will continue development of Expanded Directional Frequency Analysis and Recording, design definition of the[ ]towed array and Mine Detection and Avoidance Sonar integration into the AN/BQQ-5, and update of the Automated Threat Detection and Classification capabilities. Efforts relating to the development of the[ ]towed array, undersea warfare systems integration, and Increased Computer Capacity/ Towed Array [ ]Processing design improvements will also be continued. Program increases over FY 1982 result from the restructured schedule of Expanded Directional Frequency Analysis and Recording development, the[ ]towed array, increased effort for undersea warfare integration, block changes, and the Mine Detection and Avoidance Sonar Transmitter Unit. 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 that shown in this Descriptive Summary are as follows: (1) FY 1981 funding has decreased by 716 due to revised inflation factors. (2) Schedule stretch-out of the Expanded Directional Frequency Analysis and Recording capability development and[ ]Design/Development resulted in a 1,163 reduction in the FY 1982 estimate. (3) As stated above, due to restructuring of the Expanded Directional Frequency Analysis and Recording and[ ] schedules, the FY 1983 estimate has increased by 6,854.

Program Element: 64503N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Development (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	19,956	32,342	41,566	34,916	Continuing	Continuing
S0219	Submarine Sonar Improvements	19,956	32,342	41,566	34,916	Continuing	Continuing
	(Sub-Tasks; Quantities)*	(*)	(*)	(*)	(*)	(*)	(*)

* (Sub-Tasks and quantities are too numerous to tabulate)

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 64503N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Development (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to provide improvements to attack submarine sonar systems to maintain acoustic advantage over new quieter soviet submarines. Currently, the main effort is Expanded Directional Frequency Analysis and Recording development. This development began in FY 1980 and will replace the Multiple Interface Unit/ Digital Spectrum Analyzer (Unit 130) of the AN/BQQ-5 System with a repackaging of three Advanced Signal Processors, (AN/UYS-1's), into one water-cooled cabinet. This cabinet will provide the system)

Other ongoing efforts include the development of Improved Control Display Consoles (completed in FY 1981), towed array development, and the development of AN/BQQ-5(V) block change kits for installed systems. Also included in this program is an undersea warfare systems integration effort, computer aided classification, development of suite level guidelines to most effectively employ the systems and efforts to develop sonar tranducer improvements. Specific descriptions of these improvements are as follows: The Improved Control Display Consoles, which converted the AN/BQQ-5A to the AN/BQQ-5B, provide increased control/display flexibility to the system and reduced life cycle cost. The rotating magnetic drum memory in the original control display console is replaced with random access memory and solid-state electronics in the new unit. Towed Array Developments - The basis of the present AN/BQQ-5 Towed Array (TB-16/BQ) design was the technology available in 1973. Since that time, advances in the laboratory and in preliminary Navy tests have demonstrated improved handling characteristics and reduced self-noise in new arrays. The objectives of the Towed Array Improvement Program are to develop a towed array. AN/BQQ-5(V) and AN/BQQ-5B(V) Block Changes - Forty-one AN/BQQ-5(V) systems and nine AN/BQQ-5B(V) systems have been installed in attack submarines and at training sites. As various improvements complete development, they are identified with others in logical "blocks" of changes to be incorporated in the installed systems. Block change kits and related documentation are then developed to support the installations. Submarine Undersea Warfare System Integration - Overall undersea warfare suit-level operating guidelines were and will continue to be developed as extensions of the individual equipment guidelines which are currently employed. These guidelines will address the overall integrated employment of all undersea warfare resources aboard the platform. Computer Aided Classification - The increased detection capability of present sonars provides the operator with large numbers of potential contacts to classify as threats or non-threats. With a computer-based system the processing capacity of the computer may be utilized to aid the operator in the classification of the contacts. This will require definition of the "clues" and criteria that operators use to classify threats. The computer may also be used to apply sensor data and provide early detection of potential threat contacts. Optimum Mode Selection (Passive Only) - The AN/BQQ-5 has a large number of possible operating configurations (frequency selections, Depression/Elevation Angle selections, integration variables, etc). A subroutine that uses current ocean conditions, the potential threat, and other variables is being developed to process this data and indicate the passive mode for the best detection probability. A mine detection and avoidance sonar transmitter unit is being developed for integration into the AN/BQR-5 and will become part of a combined improvement which incorporates both the mine detection and avoidance under-ice sonar.

Program Element: 64503N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Development (Engineering)
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: Program Element 24281N, Submarines (project S0216), developed the basic AN/BQQ-5 Submarine Sonar. Program element 63504N Submarine Sonar Development (Advanced), furnishes advanced technological subsystem building-block improvements for engineering development. Prior development of the Mine Detection and Avoidance Sonar transmitter is supported in project S0239 of Program Element 24281N (AN/BQS-15 Improvement).

(U) WORK PERFORMED BY: Naval Underwater Systems Center, New London, CT, and Newport, RI; Naval Weapons Center, Crane, IN. In-House: Naval Underwater Systems Center, New London, CT, and Newport, RI; Naval Weapons Center, Crane, IN. Contractors: International Business Machine Corp., Federal Systems Division, Manassas, VA; Hughes Aircraft Company, Fullerton, CA; Gould, Inc., Chesapeake Instrument Division, Glen Burnie, MD; TRACOR, Rockville, MD; EG&G, Washington Analytical Services Center, Rockville, MD; Analysis and Technology, Inc., North Stonington, CT; Hydrotronics, Inc., Fall Church, VA; CBM Electronics Inc., Suitland, MD; Bendix, Sylmar, CA; Raytheon, Portsmouth, RI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments - During FY 1972 two sea tests were conducted which successfully demonstrated that a significantly enhanced target motion analysis. During FY 1973 and FY 1974, integration of the towed array into the AN/BQQ-5 was accomplished. A competitive development of towed arrays was conducted during FY 1974 and FY 1975. Testing of the competitive arrays occurred in FY 1976. A contract definition for Increased Computer Capacity/Towed Array Processing was conducted and the full scale development contract was awarded in FY 1976, with development continuing through FY 1979. The integration of Active Emission Receiver Processor into the system began in FY 1977 and initial design studies for an Improved Control and Display Console were performed. During FY 1977 the pre-production models of the ded Disk File were delivered and began qualification testing. The Undersea Warfare System Integration Program was initiated in FY 1977. The first Increased Computer Capacity Towed Array Processing system was installed in FY 1978. An Interim Directional Frequency Analysis and Recording program to provide 48 vernier channels of processing began. During FY 1978, efforts to develop transducer sensor improvements in the areas of encapsulation, cables and connectors, materials reliability, noise, and vibration were initiated. Block change development for installed systems were also initiated during FY 1978. Full scale development of the Improved Control Display Console was continued during FY 1980, during which time functional demonstration of the unit was accomplished. Transducer improvements continued development as did block changes for intalled sytems. Design definition was initiated for Expanded Directional Frequency Analysis and Recording during FY 1979; full-scale development was initiated in FY 1980. The Undersea Warfare System Integration Program continued the development of operational/operability guidelines for the AN/BQQ-5B(V) and AN/BQQ-5A(V) systems, and initiated activity for the AN/BQQ-5(V) guidelines. Full-scale development of the towed array was initiated in FY 1980. Design definition for the integration into the AN/BQQ-5 of the towed array and Mine Detection and Avoidance Sonar began in FY 1981. Design and fabrication of the Expanded Directional Frequency Analysis and Recording improvement will continue. Undersea Warfare Integration will continue development of operational/operability guidelines for Expanded Direction Frequency Analysis and Recording and other improvements. Block change kits to equip installed systems with new improvements will continue to be developed.

Program Element: 64503N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Sonar Development (Engineering)
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: System level integration and test of Expanded Directional Frequency Analysis and Recording will be continued. Design definition and initial design for the towed array/Mine Detection and Avoidance Sonar integration into the AN/BQQ-5 will continue. Operational/operability improvements will be incorporated into block change kits.

3. (U) FY 1983 Planned Program: System design certification and qualification of Expanded Directional Frequency Analysis and Recording will be completed. Development sea tests of the towed array will be conducted, and the Full-Scale development of towed array integration will be initiated. Hull array and operational/operability improvements will be incorporated into block change kits for the AN/BQQ-5B(V).

4. (U) FY 1984 Planned Program: System Initial Operating Capability and Approval for Service Use of Expanded Directional Frequency Analysis and Recording is planned. The first production award for the towed array is planned. Integrationn of new unit into the AN/BQQ-5 Engineering Models will commence for testing of the towed array/Mine Detection Array Avoidance Sonar improvement. Since this is a continuing program of providing to the AN/BQQ-5 sonar year-to-year variations in funding requirements occur as developments begin and end. The completion of the Expanded Directional Frequency Analysis and Recording will be off-set by the array development.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64504N
DoD Mission Area: 352 - Air Warfare

Title: Air Control (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	8,066	9,591	9,251	24,163	Continuing	Continuing
X0718	Marine Air Traffic Control and Landing System (MATCALS)	2,849	6,548	2,183	5,360	Continuing	Continuing
	Quantity - Multimode Receiver (Development Test and Evaluation/Operational Test and Evaluation)				(8)		
X0993	AN/SPN-42B Automatic Carrier Landing System (ACLS)	5,217	3,043	3,047	12,690	Continuing	Continuing
	Quantity (Development Test and Evaluation)				(2)		
W1412	Air Control (Fiber Optic Cable)	0	0	0	779	Continuing	Continuing
	Quantity (Development Test and Evaluation)				(1)		
X1579	LPH/LHA Air Traffic Control	0	0	1,491	5,034	Continuing	Continuing
	Quantity (Development Test and Evaluation)				(2)		
X1657	ATC Improvement	0	0	2,530	0	0	2530
	Quantity (Development Test and Evaluation)				(2)		

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for the development, integration, and testing of hardware and software necessary for replacing aging landing control and air traffic control equipments at Marine tactical/expeditionary airfields and landing control central equipment on aircraft carriers, aircraft compatible ships, and at Naval Air Stations. The new systems will provide more reliable all-weather landing capabilities and an automated Air Traffic Control capability resulting in improved operational capabilities and safety-of-flight at these aircraft landing sites. Also provides for development of a Multimode Receiver for use in Navy/Marine Corps aircraft, to insure compatibility with future FAA National Microwave Landing System, U.S. Air Force instrument landing systems, and the Marine Remote Area Approach and Landing System.

(U) BASIS FOR FY 1983 RDT&E REQUEST:

X0718 Marine Air Traffic Control and Landing System: To continue development efforts initiated under PE 63511N, Air Control, leading to improved all-weather operations, an increased safe-landing-rate, and significantly improved Air Traffic Control

capability at Marine Expeditionary Airfields. Tasks will include development of software and system testing. Decrease in funding under FY 1982 results principally from Navy application of a Congressionally imposed reduction and a restructuring of the program as a result of the Congressional direction to accomplish software programming with RDT&E dollars. As this is a continuing program, the above funding includes outyear escalation and encompasses all work on development phases now planned or anticipated through FY 1984 only.

X0993 AN/SPN-42B Automatic Carrier Landing System: To continue development efforts leading to improved all-weather landing operations on aircraft carriers, and to significantly increase the reliability and maintainability of carrier landing control systems. Tasks include development of hardware and software for an Engineering Development Model to be used to verify the operational performance of the AN/SPN-42B design before proceeding to the next development phase. 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.

W1579 LPH/LHA Air Traffic Control: Initiate development effort to provide Tactical Air Control Centers (TACC) aboard the seven LPH and five LHA hulls with the capability to provide simultaneous display of up to 200 targets with Direct Altitude and Identity Readout (DAIR) information to control air traffic within the Amphibious objective area. The advent of AV8 Harriers aboard these ships requires positive, precise information during any weather condition. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through 1984 only.

X1657 ATC Improvement: Develop, test and integrate software to provide a digital interface for the Navy Air Traffic Control Facilities, Programmable Indicator Data Processor for aircraft designation handoff and Controller Conflict Alert to the National Aerospace system. The Fleet Area Control facility (FACSFAC Jacksonville Virginia Capes and San Diego) requires software development to provide interfacility air control handoffs of FACSFAC to the National Aerospace System interface. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated.

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:

X0718 Marine Air Traffic Control and Landing System: Increase of 2,695 in FY 1981 is the result of a CNO directed transfer for the continuing development of the Multimode Receiver. FY 1982 decrease of 191 and 78 in FY 1983 result from Navy Budget reduction.

X0993 AN/SPN-42B Automatic Carrier Landing System: Decrease of 165 in FY 1981, 44 in FY 1982, and 45 in FY 1983 result from Navy Budget reduction.

Program Element: 64504N
DoD Mission Area: 382 - Air Warfare

Title: Air Control (Engineering)
Budget Activity: 4 - Tactical Programs

W1412 Air Control (Fiber Optic Cable): Increase of 779 in FY 1984 reflects a new start.

X1179 LPH/LHA Air Traffic Control: Increase of 1,491 in FY 1983 and 5,034 in FY 1984 reflects a new start.

X1657 ATC Improvement: Increase of 2,542 in FY 1983 reflects a new start for one time requirement.

(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	9,940	5,536	9,826	5,353	Continuing	Continuing
X0718	Marine Air Traffic Control and Landing System (MATCALS)	4,812	154	6,739	2,261	Continuing	Continuing
X0993	AN/SPN-XX Automatic Carrier Landing System (ACLS)	5,128	5,382	3,087	3,092	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
Marine Air Traffic Control and Landing System (MATCALS)							
	OPN	7,435	21,376	20,947	21,219	Continuing	Continuing
	O&MN	4,518	8,006	5,614	4,973	Continuing	Continuing

Program Element: 64504N
DoD Mission Area: 352 - Air Warfare

Title: Air Control (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION:

X0718 Marine Air Traffic Control and Landing System: The effectiveness of Marine expeditionary operations is dependent upon continuous close air support. However, weather and visibility conditions sometimes preclude launch and recovery of aircraft. The Marine Air Traffic Control and Landing System is an integrated, automated landing and terminal Air Traffic Control System which will provide the capability for all-weather operations at Marine Expeditionary Airfields, and will significantly increase Air Traffic Control capacity and the safe-landing-rate at these airfields. It will also provide the capability to control the landing of any aircraft, through the fully-automated Instrument Landing System-type crosspointer and/or Ground Controlled Approach "talkdown" guidance. The Marine Air Traffic Control And Landing System will be compatible with military and Civil Air Traffic Control facilities and associated data links, and with the proposed National Microwave Landing System. The Marine Air Traffic Control And Landing System will replace the operationally inadequate and technologically obsolete AN/TSQ-18 Air Traffic Control System with state-of-the-art equipment. The Marine Air Traffic Control and Landing System software is being developed in two phases, with a Basic Operational Capability software being developed for use in safety-of-flight testing, and the Full Operational Capability software being developed for operational use in the field. The Multimode Receiver is an airborne receiver being developed under this project. The Multimode Receiver is compatible with ground equipments of the Marine Afr Traffic Control and Landing System, Marine Remote Area Approach and Landing System, the Automatic Carrier Landing System, Air Force Instrument Landing System, Joint Tactical Microwave Landing System, and FAA National Microwave Landing System.

X0993 AN/SPN-42B Automatic Carrier Landing System: The original AN/SPN-10 Automatic Carrier Landing System was introduced into the Fleet in 1957 and upgraded in 1967 to the existing AN/SPN-42 Automatic Carrier Landing System. Logistics support for the AN/SPN-42 is becoming increasingly difficult; some parts are no longer manufactured. As a result, the Automatic Carrier Landing System availability and operational use is significantly lower than required and declining. The Automatic Carrier Landing System concept is the only system that meets the stringent requirements to accomplish continuous automatic shipboard landings. The AN/SPN-42B projects will modernize the AN/SPN-42 using present state-of-the-art techniques; Navy standard computers, gyros, displays and other peripheral equipment; and standard electronic modules (SEM) to provide a more reliable and maintainable Automatic Carrier Landing System. This will result in a marked improvement in automatic landing operations in the Fleet.

W1412 Air Control (Fiber Optics Cable): The Navy problem with cabling, both aboard ship and at Naval Air Stations, is multi-faceted: the number of different functions performed by both radar and communications has become very large. The range of signals covers the spectrum from digital bits to radar video. At Naval Air Stations, where cabling is laid underground, problems with moisture deterioration and lightning have shut down critical equipment in many instances. Costs on new installations have risen to excessive manday/material levels. This project is intended to develop a standardized set of fiber optic modules to accomodate signals from ASR-8, FPN-63, TRN-28, SPN-42AT4 radars and miscellaneous Air Traffic Control communication equipment. It is intended that these modules will be adaptable to all electronic equipment when fiber optics is to be used for external cabling.

Material savings is estimated to be at least 2:1 over using copper cables. Aboard ship, serious Electromagnetic Interference problems can be easily eliminated with fiber optic cabling.

W1579 LPH/LHA Air Traffic Control: Tactical Air Control Centers (TACC) aboard LPH/LHA are responsible for making the most effective use of aircraft to support the Amphibious Force by controlling aircraft within the Amphibious Objective Area. The Tactical Air Control Center provides the coordination to insure an integrated defense for ships and troops. An integral part of the Tactical Air Control Center is the Helicopter Direction Center (HDC) to coordinate all helicopter/VTOL operations. This project is to provide the following Tactical Air Control Center/Helicopter Direction Center/Direct Altitude Identity Readout capability: (a) Simultaneous display of up to 200 targets with Direct Altitude Identifity Readout information, (b) provide five identify filter channels on each of three consoles, (c) discriminate between two targets spaced as closely as 1/8 nautical mile, and (d) establish selectable altitude layers of targets at discretion of the operator. All friendly aircraft within 50 nautical miles of the mother ship shall be under positive Tactical Air Control Center control. This requirement must include the requirement for raw/skintrack radar in order to include all enemy aircraft/missles.

X1657 ATC Improvement: Navy Air Traffic Control Facilities require essential software program updates and improvements of embedded computer resources. The Programmable Indicator Data Processor requires interface development of an aircraft designation handoff to the National Aerospace System. In addition, software development is required for Controller Conflict Alert between military/military or military/commerical aircraft in Navy Aerospace. The Fleet Area Control and Surveillance Facility requires software development to provide interfacility (Jacksonville Virginia Capes and San Diego) air control handoffs of Fleet Air Control and Surveillance Facility/National Aerospace System interface.

(U) RELATED ACTIVITIES: Development in both the Marine Air Traffic Control and Landing System and the Automatic Carrier Landing System projects is coordinated with the Joint Tactical Microwave Landing System project, PE 63511N, Air Control, which will eventually develop tactical equipments based upon the final design of the Microwave Landing System. The Marine Air Traffic Control And Landing System and the AN/SPN-42B Automatic Carrier Landing System project will use common components where possible and will be compatible.

(U) WORK PERFORMED BY:

X0718 Marine Air Traffic Control and Landing System: In-House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD (lead laboratory); Naval Electronic Systems Engineering Center, Vallejo, CA, Marine Corps Development and Education Command, MCB Quantico, VA; Contractor: ITT Gilfillan, Van Nuys, CA, Westinghouse, Baltimore, MD, Bell Aerospace, Inc., Buffalo, NY, Sperry Univac, Minneapolis, MI.

Program Element: 64504N
DoD Mission Area: 352 - Air Warfare

Title: Air Control (Engineering)
Budget Activity: 4 - Tactical Programs

X0993 AN/SPN-42B Automatic Carrier Landing System: In-House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD, Naval Ocean Systems Center, San Diego, CA; Naval Air Test Center, Patuxent River, MD, Naval Avionics Center, Indianapolis, IN, Naval Weapons Support Center, Crane, IN. Contractors: Bell Aerospace, Inc., Buffalo, NY; Sperry Gyroscope, Great Neck, NY, CDC, Minneappolis, MN.

W1412 Air Control (Fiber Optic Cable): In-House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD, Naval Ocean Systems Center, San Diego, CA. Contractors: To be determined.

W1579 LPH/LHA Air Traffic Control: In-House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD, Naval Ocean Systems Center, San Diego, CA. Contractors: To be determined.

X1657 ATC Improvement: In-House: Naval Electronic Systems Engineering Activity; St. Inigoes, MD, Federal Aviation Agency, Jacksonville, FL,Naval Ocean Systems Center, San Diego, CA. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments:

X0718 Marine Air Traffic Control and Landing System: Under PE 63511N, Air Control, the AN/TPN-22 (XN-2) Experimental Landing System interfaced with AN/SPN-42T1 All-Weather Carrier Landing System, demonstrated the ability to provide automatic landings in Mode I (full automatic-to-touchdown), Mode II (Crosspointers on pilot's flight instruments and pilot flies the aircraft), and Mode III (Ground Controlled Approach "talkdown" and pilot flies the aircraft). Design of the Control and Central Subsystem was finalized and competitive procurement of prototype Multi-Mode Displays was initiated and awarded. Test and Evaluation of prototypes of the AN/TPN-22 Precision Approach Radar, and AN/TPS-65 Airport Surveillance Radar was completed and Basic Operational Capability software development was completed and system integration and testing commenced. The Marine Air Traffic Control and Landing System transitioned to Engineering Development in FY 1978 and construction of Engineering Development Model of the Multi-Mode Receiver began. Basic Operational Capability software developed, integrated, and being tested.

X0993 AN/SPN-42B Automatic Carrier Landing System: Conducted preliminary testing in the area of wind-over-the-deck and its effect on automatic control of all carrier-based aircraft capable of such control. AN/SPN-42B contract awarded in FY 1980. Commenced systems and subsystem - level software development and system - level hardware design of Engineering Development Unit and Engineering Development. Commenced integration of AN/SPN-42B with other shipboard systems required for Automatic Carrier landings.

Program Element: 64504N
DoD Mission Area: 352 - Air Warfare

Title: Air Control (Engineering)
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program:

X0718 Marine Air Traffic Control and Landing System: Continue flight testing of Basic Operational Capability software. Prepare design specifications and commence development of Full Operational Capability computer software. Design improvements to Independent Landing Monitor.

X0993 AN/SPN-42B Automatic Carrier Landing System: Complete wind-over-the-deck testing, continue software development, system integration, and design of Engineering Development Unit and Model.

3. (U) FY 1983 Planned Program:

X0718 Marine Air Traffic Control and Landing System: Continue development of Full Operationally Capability computer software, integrate computer software modules; conduct mockup testing of system.

X0993 AN/SPN-42B Automatic Carrier Landing System: Deliver Engin Development Model to Navy Activity for debugging and flight testing. Deliver Engineering Development Unit and begin environme. , and reliability testing.

W1579 LPH/LHA Air Traffic Control: Award development contract in December 1982. Two systems will be procured for test and evaluation.

X1657 ATC Improvement: Award contract to develop, test and integrate software for interface with the National Aerospace System.

4. (U) FY 1984 Planned Program:

X0718 Marine Air Traffic Control and Landing System. Continue development of Full Operational Capability software, including coding, integration and contractor testing. Conduct Development Test and Evaluation/Operational Test and Evaluation. Approval for Service Use.

X0993 AN/SPN-42B Automatic Carrier Landing System. Complete shore-based flight testing of Engineering Development Model. Incorporate design changes identified into service test model and commence fabrication for technical/operational evaluation to obtain approval for service use (ASU).

W1412 Air Control (Fiber Optics Cable): Initiate and award development contracts.

W1579 LPH/LHA Air Traffic Control: Deliver first system in August 1984 for debugging and computer program checkout.

Program Element: 64504N
DoD Mission Area: 352 - Air Warfare

Title: Air Control (Engineering)
Budget Activity: 4 - Tactical Programs

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

6. (U) Milestones: Not applicable.

Project: X0718
Program Element: 64504N
DoD Mission Area: 352 - Air Warfare

Title: Marine Air Traffic Control and Landing System
Title: Air Control (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION:

The effectiveness of Marine expeditionary operations is dependent upon continuous close air support. However, weather and visibility conditions sometimes preclude launch and recovery of aircraft. The Marine Air Traffic Control And Landing System is an integrated, automated landing and terminal Air Traffic Control system which will provide the capability for all-weather operations at Marine Expeditionary Airfields, and will significantly increase Air Traffic Control capacity and the safe-landing-rate at these airfields. It will also provide the capability to control the landing of any aircraft, through the fully-automated Instrument Landing System-type crosspointer and/or Ground Controlled Approach "talkdown" guidance. The Marine Air Traffic Control And Landing System will be compatible with military and Civil Air Traffic Control facilities and associated data links, and with the proposed National Microwave Landing System. The Marine Air Traffic Control And Landing System will replace the operationally inadequate and technologically obsolete AN/TSQ-18 Air Traffic Control System with state-of-the-art equipment. The Marine Air Traffic Control And Landing System software is being developed in two phases, with a Basic Operational Capability software being developed for use in safety-of-flight testing, and the Full Operational Capability software being developed for operational use in the field. The Multimode Receiver is an airborne receiver being developed under this project. The MultiMode Receiver is compatible with ground equipments of the Marine Air Traffic Control and Landing System, Marine Remote Area Approach and Landing System, the Automatic Carrier Landing System, Air Force Instrument Landing System, Joint Tactical Microwave Landing System, and FAA National Microwave Landing System.

(U) RELATED ACTIVITIES: Development in the project is coordinated with the Joint Tactical Microwave Landing System project, PE 65311N, Air Control, which will eventually develop tactical equipments based upon the final design of the Microwave Landing System. The Marine Air Traffic Control And Landing System and the AN/SPN-42B Automatic Carrier Landing System project will use common components where possible and will be compatible.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Engineering Activity, St. Inigoes, MD (lead laboratory), Naval Electronic Systems Engineering Center, Vallejo, CA; Marine Corps Development and Education Command, MCB Quantico, VA, Contractor: ITT Gilfillan, Van Nuys, CA; Westinghouse, Baltimore, MD; Bell Aerospace, Inc., Buffalo, NY, Sperry Univac, Minneapolis, MI.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: Under PE 63511N, Air Control, the AN/TPN-22 (XN-2) Experimental Landing System interfaced with AN/SPN-42T1 All-Weather Carrier Landing System, demonstrated the ability to provide automatic landings in Mode I (full automatic-totouchdown), Mode II (Crosspointers on pilot's flight instruments and pilot flies the aircraft), and Mode III (Ground Controlled Approach "talkdown" and pilot flies the aircraft). Design of the Control and Central Subsystem was finalized and competitive procurement of prototype Multi-Mode Displays was initiated and awarded. Test and Evaluation of prototypes of the

Project: X0718 Title: Marine Air Traffic Control and Landing System
Program Element: 64504N Title: Air Control (Engineering)
DoD Mission Area: 352 - Air Warfare Budget Activity: 4 - Tactical Programs

AN/TPN-22 Precision Approach Radar, and AN/TPS-65 Airport Surveillance Radar was completed and Basic Operational Capability software development was completed and system integration and testing commenced. The Marine Air Traffic Control and Landing System transitioned to Engineering Development in FY 1978 and construction of Engineering Development Model of the Multi-Mode Receiver began. Majority of FY 1981 funds applied to the dual competitive Multi-Mode Receiver contracts.

2. (U) FY 1982 Program: Continue flight testing of Basic Operational Capability software. Prepare design specifications and commence development of Full Operational Capability computer software. Design improvements to Independent Landing Monitor.

3. (U) FY 1983 Planned Program: Continue development of Full Operational Capability computer software; integrate computer software modules; conduct mockup testing of system.

4. (U) FY 1984 Planned Program: Complete coding, integration, and contractor testing of Full Operational Capability software. Conduct Development Test and evaluation/operational Test and Evaluation. Approval for Service Use.

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
X0718	Marine Air Traffic Control and Landing	2,849	6,548	2,183	5,660	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64505N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Attack Submarine Integrated Communication 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	0	5,810	0	0	0	5,810 1/
X1411	Attack Submarine Integrated Communication System	0 3/	5,810	(1,730)1/	(5,633)1/	(Continuing)1/	(Continuing)1/
	(Quantity - Engineering Development Models)						
	- (Sensor Interface Unit)	(6) 2/					(6) 2/
	- (Submarine Tactical Data Link System)	(6) 2/					(6) 2/
	- (Secure Switch)	(3) 2/					(3) 2/
	- (Submarine Keyboard Printer)	(3) 2/					(3) 2/

1/ Project X1411 transfers to Program Element 64524N (Submarine Advanced Combat System (Engineering) in FY 1983. Total estimated cost applies only to this program element. FY 1983 and later estimates, which are presented in the Descriptive Summary for Program Element 64524N, are repeated here for convenience and do not contribute to the program element totals.
2/ Development/Operational Test and Evaluation. These test items were procured in FY 1981 under Program Element 63520N.
3/ FY 1981 and prior effort was funded in project X0712 of Program Element 63520N (Advanced Communications).

(U) BRIEF DESCRIPION OF ELEMENT AND MISSION NEED: The communications support function is among the most important which must be accomplished by the Attack Submarine in the performance of missions against any threat. The long term objective of this program is to develop an Integrated Communications System which will provide an improved internal and external information transfer system that is reliable, flexible, and timely; is more conducive to communications at will; contributes to overall attack submarine combat system effectiveness, and interfaces effectively with other command and control subsystems. The near term objective, update of existing radio rooms on a continuing basis, is essential to maintain a communications capability which meets the needs of present and future operational requirements. Currently, the highest priority task in the project is the Data Link Communication System which supports TOMAHAWK Over-the-Horizon Targeting in attack submarines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: No FY 1983 funds are requested under this program element. Refer to the Descriptive Summary for Program Element 64524N (Submarine Advanced Combat System (Engineering)).

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 (amended) Descriptive Summary and this Descriptive Summary are as follows: RDT&E - Although this program element does not appear in the FY 1982 budget, it contains the FY 1982 funding requested under project X1411 of Program Element 64524N (Submarine

Program Element: 64505N
(U) Mission Area: 233 - Anti-Submarine Warfare

Title: Attack Submarine Integrated Communication System
Budget Activity: 4 - Tactical Programs

Advanced Combat System (Engineering)). (1) With respect to that request, the FY 1982 estimate has increased by 2,210 due to increased activity in support of submarine launched TOMAHAWK missile requirements. (2) The procurement year for the test items shown in the funding profile has been changed to correct an error in the FY 1982 Descriptive Summary for Program Element 64524N. Other Procurement, Navy - With respect to the estimates shown in the FY 1982 Descriptive Summary for Program Element 64524N, the FY 1982 estimate has increased by 3,943 to reflect revisions in installation plans for the submarine-launched TOMAHAWK capability, requiring increased procurement of Data Link Communications System equipment.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Refer to the Descriptive Summary for Program Element 64524N (Submarine Advanced Combat System (Engineering)).

(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	(1,000)1/	7,900	(12,734)1/	(6,233)1/	(Continuing)1/	(Continuing)1/

1/ Repeated, for convenience, from the Descriptive Summary for Program Element 64524N.

Program Element: 64505N
DoD Mission Area: 233 -Anti-Submarine Warfare

Title: Attack Submarine Integrated Communications System
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Attack Submarine Integrated Communication System incorporates one minor and two major programs. It is a new start in FY 1982 with previous work accomplished under project X0712 of Program Element 63520N (Advanced Communications). The first major project is the BRICKBAT priority Data Link Communications System which will use newly developed and modified existing equipment to provide over-the-horizon targeting data to and from the Attack Submarine Combat Control System for command and control of TOMAHAWK. Developmental equipment in this project includes the AN/USQ-76(V)3, Data Terminal Unit and the J-3780/UYK Sensor Interface Unit, which accepts data inputs from several sources to allow a serial transfer of binary data to the Attack Submarine Combat Control System. The Sensor Interface Unit also takes data from the Combat Control System and transfers the data to the correct communication channel. The second major program is the Integrated Communication System which will provide an improved communication suite for future attack submarines, designed to respond to projected requirements of the 1990 to 2020 time frame. The Integrated Communication System adds a standard bus architecture to simplify modifications and to enable growth, provides an automated control, monitor, tune and test function, and will improve message and data distribution. The Integrated Communication System will reduce training requirements and improve availability. The Integrated Communication System is a major subsystem of the Submarine Advanced Combat System . Other work which will proceed under this program as a relatively low priority tasking will be to make near term improvements to attack submarine communications. This includes support for procurement of the Submarine Keyboard Printer and the Signal Distribution System.

(U) RELATED ACTIVITIES: Integrated submarine antenna and radio frequency distribution systems are developed under Program Element 64502N, Submarine Communications. The Attack Submarine Integrated Communications system will be a part of the Submarine Advanced Combat system being developed under this program element. The test item procurements described above support the submarine initial operating capability schedule for the TOMAHAWK missile system (Program Element 64367N).

(U) WORK PERFORMED BY: In-House: Naval Electronics Systems Command, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Undersea Systems Center, New London, CT; and Fleet Combat Direction Systems Support Activity, San Diego, CA. Contractors: Computer Science Corporation, Falls Church, VA Magnavox, Philadelphia, PA; AMEX, Hawthorne, CA; R. M. Vredenberg, McLean, VA AVW, Inglewood, CA and three others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Under project X0712 of Program Element 63520N (Advanced Communications) the Integrated Communication System began Demonstration and Validation in 1979. The Integrated Communicacion System became a major subsystem of Submarine Advanced Combat System in 1980. During 1981 work progressed on preparation of a technical data package, including an Attack Submarine Description. In September 1979 the Chief of Naval Operations directed that the communication capability embodied in the Data Link Communiation System be provided for attack submarines to support TOMAHAWK over-the-horizon targeting. In 1980 the Link 11 capability was added to the Data Link Communication System. The present Data Link Communication System configuration

was approved by the Chief of Naval Operations in June 1980. During FY 1981 developmental work continued on the Sensor Interface Unit, the Data Terminal Unit and on the supporting communications networks. By the end of 1981 equipment was being installed at a land based test facility to begin integration testing.

2. (U) FY 1982 Program: Program transfers to this element to continue the Data Link Communication System development and test and evaluation and support procurement of the Submarine Keyboard Printer and the Signal Distribution System. Integrated Communication System development has been deferred until 1984 to support fleet introduction of the submarine-launched TOMAHAWK missile capability.

3. (U) FY 1983 Planned Program: Program continues in Program Element 64524N. Refer to the corresponding Descriptive Summary.

4. (U) FY 1984 Planned Program: Refer to the Descriptive Summary for Program Element 64524N.

5. (U) Program to Completion: Refer to the Descriptive Summary for Program Element 64524N.

6. (U) Milestones: Refer to the Descriptive Summary for Program Element 64524N.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64506N
DoD Mission Area: 276 - Defensive Chemical & Biological Systems

Title: BR/CW 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	3,710	7,740	8,357	8,398	Continuing	Continuing
S0410	BR/CW Countermeasures	3,710	7,740	8,357	8,398	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is required to develop shipboard advance warning and automatic point detection capabilities in defense of a chemical attack. The advance warning system, a remote sensor, will alert the ship to an attack upon that ship or another formation ship; the automatic point detector will alert ship personnel of chemical agents in the immediate area. This program will also develop shipboard collective protection systems appropriate for U.S. Navy application. As well, the program will pursue while improving the present MK 5 gas mask pending further development of a satisfactory XM 30 mask. These equipments are required to protect personnel from chemical attack.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Support fleet introduction of the Chemical Warfare Directional Detector and the Chemical Agent Point Detector System interim advance warning system. Continue the development of an automatic, scanning chemical agent point detector advance warning system. Continue evaluations and select design for Advanced Chemical Agent Detector and Alarm System. Complete preliminary design of contamination systems for aircraft and personnel. Install improved water washdown system for shipboard test and evaluation. Initiate installation of a collective protection system prototype for an LHA amphibious assault ship. Continue development of improved filters, fans, seals and controls for shipboard collective protection systems. Complete prototype of inflatable decontamination stations protection device evaluation. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated thro . FY 1984.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes in the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: FY 1981 reduction of $133 and FY

Program Element: 64506N
DoD Mission Area: 276 - Defensive Chemical & Biological Systems

Title: BR/CW Countermeasures
Budget Activity: 4 - Tactical Programs

1982 reduction of $308 resulted from revised inflation estimates; the FY 1983 decrease of $1,346 resulted from changes during FY 1983 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	2,562	3,843	8,048	9,703	Continuing	Continuing
S0410	BR/CW COUNTERMEASURES	2,562	3,843	8,048	9,703	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
O&M,N		1,350	6,805	7,592	40,945	56,692
OPN		1,055	997	1,927	TBD	TBD
Quantities (Chem. Agent Point Detectors)			-	(16)	TBD	TBD
(Chem. Warfare Directional Detectors)		(10)	(13)	(	TBD	TBD

Program Element: 64506N
DoD Mission Area: 276 - Defensive Chemical and Biological Systems

Title: BR/CW Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGOUND AND DESCRIPTION. This engineering development program will provide advance warning and automatic point detection of a chemical warfare agent attack and provide U. S. Navy ships with a shipboard collective protection system option.

Funds were approved in FY 1975 to develop a chemical advance warning capability for U. S. Navy ships by its incorporation into the shipboard fire control mission utilizing Forward Looking Infrared imaging sensors. It is planned that the [ ] would be installed in U.S. Navy ships with [ ] However, delays in the [ ] program have prevented the installations to date. The [ ] was successfully evaluated with a spectral filter wheel and narrow-band interference filters for manual and phone talker capability. An automatic 360 degree detector system for use in conjuncton with [ ] will be developed for automatic applicaton. The Chemical Agent Detection and Alarm Set (Ionization Detector), which was developed by the Air Force and Army, is being evaluated to determine its effectiveness in a shipboard operational environment.

The USN Shipboard Toxicological Operational Protective System was installed in USS HERBERT J. THOMAS (DD 833) in the 1960's. The Nuclear Biological Chemical Protection System was tested extensively and operated satisfactorily for several years, but was considered too expensive for Fleet-wide adoption. Threat analysis in light of new technology indicates further evaluation is required of collective protection and individual protection, warning, decontamination and immunization improvements. Moreover, collective protection is now required in all new FY 85 and subsequent Navy Ships.

(U) RELATED ACTIVITIES: The [ ] projects have been developed under Program Element 64607N. The Ionization Detector has been developed by the Air Force and Army under Project No. AD 27-01.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA. Contractor: Texas Instruments, Dallas, TX, Honeywell, Inc., St. Petersburg, FL.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Although the program was initiated in FY 1975, several tests were performed beginning in FY 1973. The tests demonstrated that a Forward Looking Infrared device can provide significant chemical agent detection capability by observing and tracking [ ] In FY 1975, operational field tests were performed at Dugway Proving Grounds, Utah. A simulant [ ] was observed and tracked. Successful detection tests have been performed in both clear and overcast conditions, as well as in semi-marine and dust filled environments. Based on these results an interim advanced warning detector was developed and evaluated [ ]

Program Element: 64506N
DoD Mission Area: 276 - Defensive Chemical and Biological Systems

Title: BR/CW Countermeasures
Budget Activity: 4 - Tactical Programs

Air Force prototype chemical agent ionization detectors were acquired, modified for shipboard use, and evaluated for electromagnetic vulnerability. Navy requirements input were provided for incorporation into the Joint Service Operational Requirements for an Automatic Chemical Agent Detection and Alarm System.

Shipboard testing of the USAF prototype ionization detector was conducted in order to define interfering products of Naval Operations (mission/rocket firing, conventional weapon firing, amphibious operations, maintenance and repair of aircraft, inboard fire fighting activities, aircraft washdowns, painting operations, equipment disembarkation from well deck area of amphibious landing craft, aircraft engine maintenance, repair and testing). Elevated background responses were noted in various locations aboard ship. Three U. S. Air Force production model ionization detectors were acquired, laboratory tested, subjected to electromagnetic vulnerability tests, modified for Navy use and subjected to initial shipboard testing. Preliminary results indicate that the production model is vulnerable to certain petroleum combustion products.

A Chemical Agent Point Detector System suitable for Naval use was designed based on composite features of the evaluated systems. Developmental tests were completed in FY 81 and Operational testing is planned.

Collective Protection System: Design work for a full-time Collective Protection System prototype for the LHA Class initiated, developmental efforts were also initiated for supporting systems (filters, fans, controls. seals).

2. (U) FY 1982 Program: Operational testing of the CW Directional Director and Chemical Agent Point Detector will be completed. Development of the automatic advance warning system will continue.

Continue and complete design of Advanced Chemical Agent Detection and Alarm and file a summary report.

Continue laboratory studies for the selection of candidate chemical agent decontamination compounds and apparatus for Navy use. Conclude laboratory studies to define use concept and decontamination test procedures.

Complete design of a collective protective system prototype for a LHA amphibious assault ship. Develop ship installation drawing and cost estimates. Develop required associated equipment for filtering, sealing, control of pressurized zones. Determine requirement and design prototype decontaminants stations for use with collective protection system on backfit and new construction.

Program Element: 64506N
DoD Mission Area: 276 - Defensive Chemical and Biological Systems
Title: BR/CW Countermeasures
Budget Activity: 4 - Tactical Programs

Introduce new chemical protective clothing for the U.S. Navy. Complete MK 5 gas mask nose piece and communication improvement.

3. (U) FY 1983 Planned Program: Development of an automatic 24-hour/day operation, 360 degree azimuth advance warning system will continue with evaluation of initial design concepts.

Complete laboratory work and shipboard tests on advanced ionization detector (ACADA).

Continue aircraft decontamination studies and Marine Corps Interface studies.

Define decontaminant procedures and materials for shipboard use.

Install chemical collective protection prototype design for LHA Class ships.

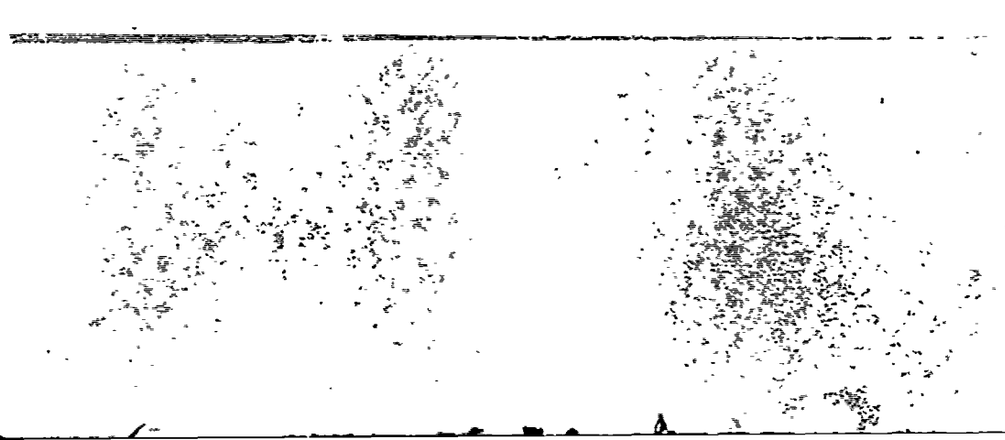
Complete demonstrated model of inflatable decontamination station for amphibious ships and carriers.

Install and test improved water washdown system.

4. (U) FY 1984 Planned Program: Conduct comprehensive evaluation of automatic advance warning system. Complete LHA chemical collective protection system installation and commence Fleet evaluation. Continue 1983 initiatives. Commence development of chemical threat level discrimination device. Commence shipboard immunization initiatives. Develop alternative decontamination techniques. Continue improved water washdown system development. Initiate CB and CG collective protection system design studies. Continue overseas shore collective protection evaluation, runway decontaminaton, and small craft collective protection system development.

5. (U) Program to Completion: This is a continuing program consisting of separate development efforts which may have finite completion dates. For example, if successful, a chemical point detector will be installed in Navy ships commencing in FY 1983 as will be protective clothing and decontaminants. The [redacted] system will be comprehensively evaluated in FY 83 for detection, identification and discrimination capabilities in the at-sea and littoral environments for multi-ship application. The interim directional chemical detector will be completed in FY 82 for installation and for service use. Other improvements in clothing, masks, detectors, immunization, simulants, alarms and collective protection continue.

6. (U) Milestones: Not applicable.



FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64507N
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance

Title: Enhanced Modular Signal Processor
Budget Activity: 4 - Tactical Programs

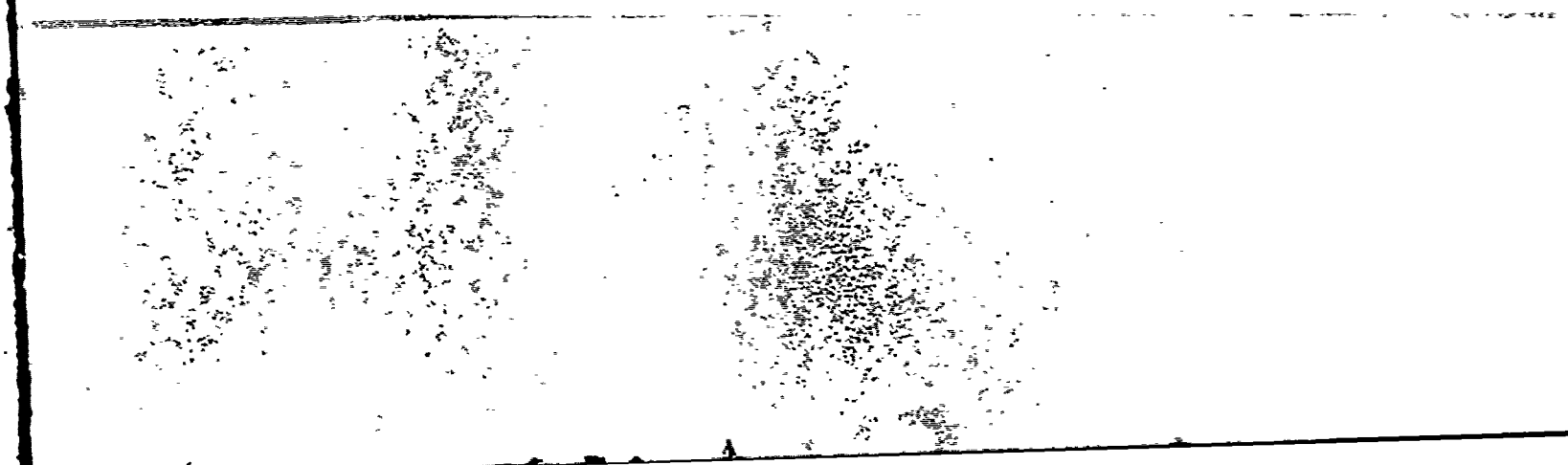
(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

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	14,497	15,257	Continuing	Continuing
S1440	Enhanced Modular Signal Processor	0 1/	0 1/	14,497	15,257	Continuing	Continuing
	(Quantities						
	- Functional Development Models 2/	(-)	(3)	(-)	(-)	(0)	(3)
	- Engineering Development Models 3/)	(-)	(12)	(-)	(-)	(0)	(12)

1/ Refer to Descriptive Summary for Program Element 63524N, Project S1346 (Submarine Advanced Combat system) in FY 1981 and Project S1440 (Enhanced Modular Signal Processor) in FY 1982.
2/ Identified as software development models in prior Descriptive Summaries; procured in FY 1982 for FY 1984 delivery.
3/ Development/Operational Test and Evaluation; procured in FY 1982 for FY 1985 and later delivery.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Meet near term and far term (1990's and later) signal processing requirements for a broad range of mission/platform applications. The AN/UYS-2 Enhanced Modular Signal Processor will provide a Navy Standard Signal Processor exceeding the throughput capability of the AN/UYS-1 Advanced Signal Processor. Basic Enhanced Modular Signal Processor architecture will incorporate a high degree of flexibility for multiple applications and will include provision for technology-limited growth. The Enhanced Modular Signal Processor will form the basic building block of the Submarine Advanced Combat System, and a number of other ASW sensor systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Initiate full-scale engineering development for the Enhanced Modular Signal Processor Program. Conduct factory acceptance tests of the three functional development models. Continue fabrication of shipboard configured engineering development models for FY 1985 delivery. Develop totally integrated software and hardware components and environments. Establish intensive software verification and validation activities (contractors, Navy laboratories and first user), refine graphical signal processing procedures, initiate software testing and design verification and establish an In-Service Engineering Activity. In the hardware arena, development will continue for the software engineering facility, functional development model and engineering development models. 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.



Program Element: 64507N Title: Enhanced Modular Signal Processor
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: Although this program element does not exist in the FY 1982 budget, it contains and updates FY 1983 and later funding shown in the FY 1982 Descriptive Summary for Program Element 63524N, Project S1440 (Enhanced Modular Signal Processor). With respect to the aforementioned Descriptive Summary, the FY 1983 estimate has decreased by 1,849 due to refinement.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: (See Descriptive Summary for Program Element 63524N, Submarine Advanced Combat System (Advanced)).

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 64507N
Title: Enhanced Modular Signal Processor
D.o. Mission Area: 2/ - Naval Warfare Surveillance and Reconnaissance
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The AN/UYS-2 Enhanced Modular Signal Processor is a special purpose modular 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 without increase in cost, power and space requirements. It is designed to meet the Signal Processing needs of the Navy through the 1990's. It is designed to accept new technology (e.g. very high speed integrated circuits) as feasible to extend its capabilities. The Enhanced Modular Signal Processor is being developed competitively with five Corporations developing detailed designs. One of these designs will be chosen for full scale development. 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.

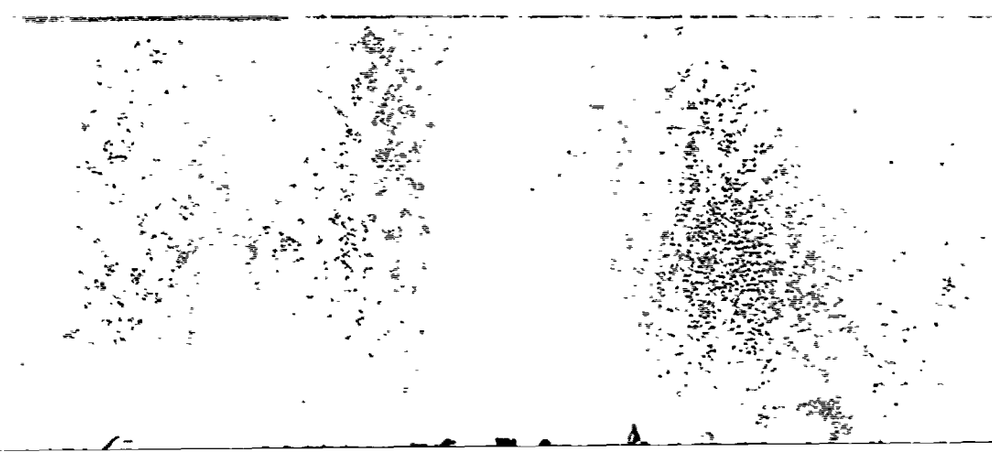
(U) RELATED ACTIVITIES: Enhanced Modular Signal Processor configurations will form the basic building block of a number of ASW sensor systems of which the earliest requirement is identified with the Combat Control/Accoustic subsystem of the submarine Advanced combat System (Project S1346 of Program Element 63524N and Project S1347 of Program Element 64524N). The common operating software support being developed for the AN/UYS-1 Advanced Signal Processor (Program element 64266N, Project W0490) will be transportable to the Enhanced Modular Signal Processor.

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT; Naval Research Laboratory, Washington, D.C.; Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA. Contractors: International Business Machines, Manassas, VA; Control Data Corporation, Minneapolis, MN; Western Electric, Greensboro, NC; Hughes Aircraft Company, Fullerton, CA; Magnavox, Ft. Wayne, IN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: Developed a procurement strategy and solicited proposals for competitive detailed design of the hardware, software, and support of Enhanced Modular Signal Processor. The Milestone I decision was achieved allowing the evaluation of the industry proposals. Five contracts were awarded, under Program Element 63524N, Project S1346, Submarine Advanced Combat System.

2. (U) FY 1982 Program: The five contractors will complete the competitive design and validate that the risks inherent in their design can be mitigated. Milestone II decision will be obtained to allow 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. 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.



Program Element: 64507N Title: Enhanced Modular Signal Processor
DoD Mission Area: 237 - Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Initiate full scale development. Actual hardware and software will be produced. The designs will undergo intensive detailed validation and verification. Graphical signal processing procedures will be finalized. The software evaluation facilities (contractor, Navy laboratories and first user) and the In-Service Engineering Activity will be established. The Functional Development Models will be in factory acceptance tests. The Engineering Development Models will begin production.

4. (U) FY 1984 Planned Program: Three Functional Development Models will be delivered and installed in the Software Evaluation Facilities. Intensive hardware, software and systems test and evaluation (including independent validation and verification) will be conducted. The contractor will deliver the first Engineering Development Model and will be in the process of building eleven other units. Substantive user interfaces will be developed and user software will begin testing on the Functional Development Models. Support programs will be under full development and the In Service Engineering Activity will be on-line to support the Functional Development Models and Engineering Development Model units.

5. (U) Program to Completion: Engineering Development Models will be delivered to users, beginning with the submarine Advanced Combat System, and user testing will begin. The remaining eleven Engineering Development Models will be delivered and testing will be completed, including a land based operational appraisal. This will lead to a Milestone III in early FY 1986 with limited production beginning shortly thereafter. Software and hardware will be under configuration management and the In-Service Engineering Activity will begin to take full maintenance authority. Full production will begin after Operational Evaluation of systems using Enhanced Modular Signal Processor.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64508N
Title: Radar Surveillance Equipment
DoD Mission Area: 237 Naval Warfare Surveillance and Reconnaissance
Budget Activity: 4 - Tactical Programs

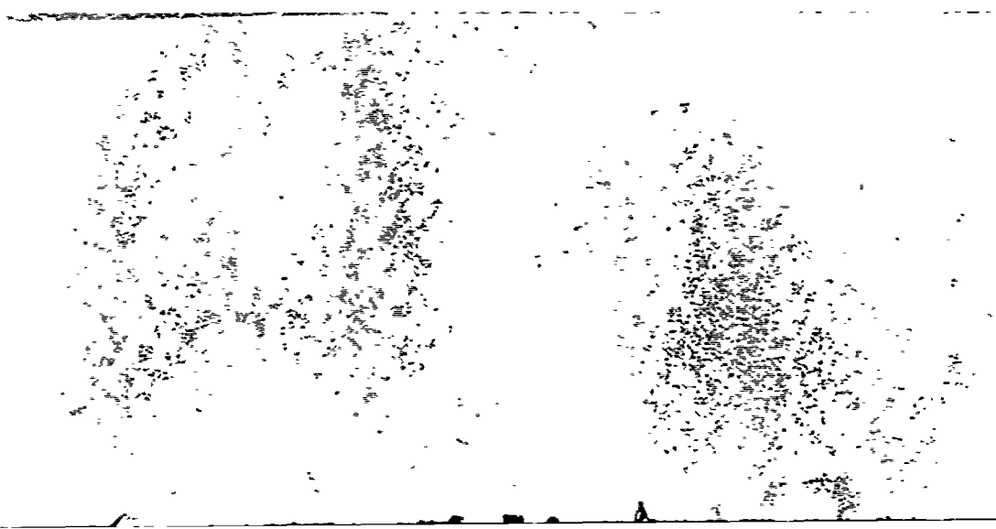
(U) RESOURCES (PROJECT LISTING) (Dollars in Thousands)

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	11,036	15,409	10,488	8,965	Continuing	Continuing
S0166	SPS Improvement Program	6,459	11,542	6,607	8,269	Continuing	Continuing
S0876	Radar Automation	4,577	3,867	3,881	697	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop an improved radar detection system for various ships combat systems of provide Integrated Automatic Detection and Tracking capability. Develop and test operational and reliability improvements to the established standard product line of shipboard surveillance radars (Automatic Target Detection, improvements such as solid state technology and Standard Electronic Modules), and associated equipments (displays and switchboards).

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete testing of Automatic Target Detection SPS-48E for New Threat Upgrade, Continue development of SPS-67 Automation Module and a new family of displays and switchboard having improved Reliability, Maintainability and Availability and commence testing of SPS-40 solid state transmitter. Continue testing of SYS-2 Integrated Automatic Detect and Track interface for New Threat Upgrade guided missile cruisers (CG and CGN 36/38 Class). 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. Funding in FY 1983 for SPS Improvement Program (S0166) started out almost $3000K less than for FY 1982 and was further reduced more than $2,500K to current levels, which has constrained efforts in several important areas.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) Changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: SPS Improvement Program (S0166) reduction in FY 1981 (591), FY 1982 (653) and FY 1983 (2,832) are due to budgetary constraints and commensurate required budgetary realignments. Radar Automation (S0875) reduction in FY 1981 (32), FY 1982 (55) and FY 1983 (247) are due to routine budget adjustments.



Program Element: 64509N
DoD Mission Area: 237 Naval Warfare Surveillance and Reconnaissance

Title: Radar Surveillance Equipment
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 Estimate Cost
	TOTAL FOR PROGRAM ELEMENT	16,09[illegible]	11,659	16,117	13,567	Continuing	Continuing
S0166	SPS Improvement Program	9,52[illegible]	7,050	12,19[illegible]	9,439	Continuing	Continuing
S0876	Radar Automation	6,565	4,609	3,922	4,128	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

Other Procurement, Navy

(U) S0166 SPS Improvement Program

Equipment	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
AN/SPS-48	2,700	9,500	93,700	36,400	Continuing	Continuing
AN/SPS-49	10,400	10,600	29,300	17,400	Continuing	Continuing

(U) S0876 Radar Automation

Equipment						
AN/SPS-1/2	1,300	5,100	16,200	14,700	Continuing	Continuing
AN/SPS-67	-	2,900	3,100	8,100	Continuing	Continuing
AN/SPS-40	9,900	7,000	14,200	14,600	Continuing	Continuing
RADAR SUPPORT	3,100	5,400	6,2[illegible]	15,600	Continuing	Continuing
AN/SPS-39/52	6,700	9,200	500	4,900	Continuing	Continuing

Program F[illegible] 64[illegible] Title: Radar Surveillance Equipment
DoD Mi[illegible] [illegible]Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

(U [illegible]KGROUND AND DESCRIPTION: S0166 SPS Improvement Program - Because of reduced anti-air warfare performance, in which sur[illegible]rveillance radar capability is a major contributing factor, the Navy outlined the anti-air warfare Readiness Plan of 1 May 1971, which directed the development of search radar improvements to upgrade Fleet anti-air warfare capability. This project provides development and testing of operational and reliability improvements to the exirting radars and associated equipments.

(U) S0876 Radar Automation - Develops a Radar Automation System for the DDG-15, CG-16/26, CGN-36/38, CV and other Class Combat Systems which provides Integrated Automatic Detection and Tracking capability. The Integrated Automatic Detection and Tracking yields a single, unduplicated radar picture taki[illegible] advantage of the mutually supporting aspect of the 3D and 2D Air Search Radars (DDG 15 SPS-40B/C/D and SPS-52C; CG:SPS-49, SPS-48E; CGN:SPS-49, SPS-48E, CV.SPS-49, SPS-48C). Signal processing provides for Constant False Alarm Rate and target return centroiding, computer generated video selection, sensitivity control, directed elevation scan and logic commands interfacing with and providing highly accurate tracking data to the Tactical Data System and Weapon Direction System for threat assessment and weapon designation.

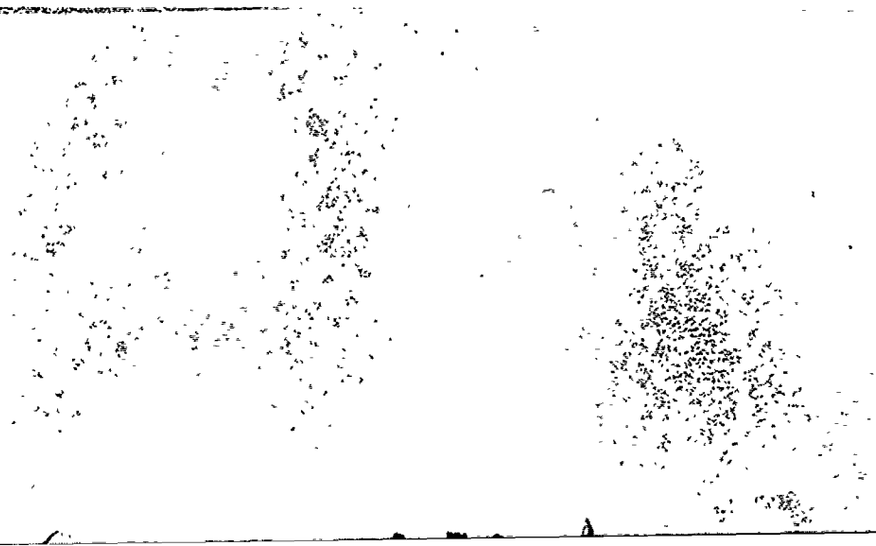
(U) RELATED ACTIVITIES: Combat Systems Integration PE 63582N, DDGX Systems and DDGX Development, PE 63589N, Project S1449, Light Weight Aegis, Ship Dauage Control and Prevention, PE 63514N, Project P0384; New Threat Upgrade, PE 64352N, Project SG188.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Weapons Center, China Lake, CA; Naval Sea System Command Detachment, Norfolk, VA; Naval Ship Weapon System Engineering Station, Port Hueneme, CA; Naval Surface Weapons Center, Dahlgren, VA. Naval Avionics Center, Indianapolis, IN; Naval Research Laboratory, Washington, D.C. Contractors: Automation Industries Inc. Vitro Laboratories Division, Silver Spring, MD; UNIVAC, St. Paul, [illegible]; Raytheon Co., Wayland, MA; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; ITT-Gilfillan, Inc., Van Nuys, CA, Hughes Aircraft Co., Fullerton, CA; Technology Services Co., Silver Spring, MD; Cardion Electronics, Woodbury, NY; Westinghouse Electric Co., Baltimore, MD.; Norden Systems, Norwalk, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS.

1. (U) FY 1981 and Prior Accomplishments:

(U) S0166, SPS Improvement Program - This program addressed two aspects of the existing surveillance radar standard product line equipments - operational improvements, dealing with Automatic Target Detection and, secondly, major reliability and technology improvements. With regard to Automatic Target Detection, this capability has been developed for the SPS-40 and SPS-52 series radar; efforts have been initiated for AN/SPS-49 Automatic Target Detection and AN/SPS-67 Automation Module, Automatic Detect and Track has been incorporated in the AN/SPS-48C model. Major reliability/technology improvements have included a solid state



version (SPS-67) of the SPS-10 with service approval granted in August 1980. Major efforts have commenced with respect to development of SPS-55 Antenna Pedestal Field Changes and a solid state transmitter for the SPS-40B/C/D.

(U) S0876, Radar Automation - The thrust has been the development of an Integrated Automatic Detection and Tracking capability for product line surveillance radar sensor suites. FY 1978 was the initial year of the Integrated Automatic Detection and Tracking effort; the first product was the SYS-1 Integrated Automatic Detection and Tracking system for the DDG-15 class ships, with current effort to develop a SYS-2 Integrated Automatic Detection and Tracking for cruisers in support of the New Threat Upgrade program.

2. (U) FY 1982 Program:

(U) S0166 SPS Improvement Program - Commence testing of SPS-49 Automatic Target Detection and continue testing of SPS-48E New Threat Upgrade modification; continue development of SPS-67 Automation module, RMA replacement displays and switchboards and an SPS-40 solid state transmitter; conduct Fleet Operational Test and Evaluation of the selected Class B radars to replace the multiplicity of Type IV surface search radars and complete testing of SPS-55 antenna field changes.

(U) S0876, Radar Automation - Conduct SYS-2 (CG/CGN) Land Based Testing; conduct DT/OT-III and obtain production approval.

3. (U) FY 1983 Planned Program:

(U) S0166, SPS Improvement Program - Complete testing of SPS-48 New Threat Upgrade modifications. Complete development and commence testing of SPS-40 solid state transmitter. Commence development of SPS-49 solid state transmitter. Continue development of the SPS-67 automation module and of RMA replacement displays and switchboards.

(U) S0876 Radar Automation - Correct OPEVAL deficiencies in SYS-1 and SYS-2 and obtain ASU. Initiate development of IADT for CV/CVN classes if funds are available.

4. (U) FY 1984 Planned Program:

(U) S0166, SPS Improvement Program - Complete development and commence testing of the RMA replacement display and switchboard for non-Naval Tactical Data System Units and the SPS-67 Automation Mode, and complete testing of SPS-40 solid state transmitter. Commence development of an SPS-48 operational training simulator and of an SPS-49 survivable phase scan antenna. Continue development of an SPS-49 solid state transmitter.

Program Element: 64508N
DoD Mission Area: 237-Naval Warfare Surveillance and Reconnaissance

Title: Radar Surveillance Equipment
Budget Activity: 4 - Tactical Programs

(U) S0876, Radar Automation - Complete correction of SYS-1 and SYS-2 OPEVAL deficiencies. Continue development and testing of SYS-(CV), and commence integration of surface search radars and identification friend or foe systems into Integrated Automatic Detect and Track Systems and development of IADT for other ship classes such as FFG-7, LHA-1 and CG-47 based upon availability of funding.

5. (U) Program to Completion:

(U) S0166 SPS Improvement Program - Testing of new Reliability, Maintainability, and Availability (RMA) displays and switchboards and the SPS-67 Automation Module will b leted. Complete development & testing of the SPS-48 operational training simulator and SPS-49 solid state transmitter and su ble phase scan antenna. Develop and test ECCM mods. Reliability, Maintainability, Availability improvements to existing product line radars will be pursued as Fleet experience dictates and 6.3 funded radar development efforts from the Survivability Program (PE 63514N) will be transitioned to PE 64508N. This is a continuing program.

(U) S0876 Radar Automation - Depending upon the availability of funding, continue integration of surface search radars and identification friend or foe into Integrated Automatic Detect and Track systems and the inclusion of other ship classes as directed. Additional Integrated Automatic Detection and Tracking efforts will be undertaken as dictated by mission requirements and higher level approval.

Project: S0166 Title: SPS Improvement Program
Program Element: 64508N Title: Radar Surveillance Equipment
DoD Mission Area: 237-Naval Warfare Surveillance and Reconnaissance Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Because of reduced anti-air warfare performance, in which surface ship surveillance radar capability is a major contributing factor, the Navy Anti-Air Warfare Readiness Plan directs the development of search radar improvements to upgrade Fleet anti-air warfare capability. This project provides development and testing of operational and reliability improvements to the radars and associated equipments comprising the existing standard product line in response to that direction.

(U) RELATED ACTIVITIES: Combat Systems Integration, PE 63582N, DDGX Combat Systems and DDGX Development, PE 63589N, Project S1449, Light Weight Aegis; Ship Damage Control and Prevention, PE 63514N, Project S0384; New Threat Upgrade, PE 64352N, Project S0188-AA.

(U) WORK PERFORMED BY: In-House: Naval Avionics Center, Indianapolis, IN; Naval Research Laboratory, Washington, D.C.; Naval Sea Systems Command Detachment, Norfolk, VA; Naval Weapons Center, China Lake, CA; Naval Ship Weapon Systems Engineering Station, Port IN, Naval Research Laboratory, Washington, D. C.; Naval Sea Systems Command Detachment, Norfolk, VA; Naval Weapons Center, China Lake, CA; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA. Contractors: ITT-Gilfillan, Inc., Van Nuys, CA; Automation Industries, Inc./Vitro Laboratories Division, Silver Spring, MD; UNIVAC, St. Paul, MN; Raytheon Co., Wayland, MA; Hughes Aircraft Co., Fullerton, CAA; Technology Services Co., Silver Spring MD; Applied Physics Laboratory/John Hopkins Universit, Laurel, MD; Norden Systems, Norwalk, CT; Cardion Electronics, Woodbury, Ny; Westinghouse Electric Co., Baltimore, MD.
(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Program was initiated to provide the Fleet with new surveillance radars and to provide improved capability and Reliability, Maintainability, and Availability (RMA) for existing models such as the solid state replacement (AN/SPS-67) for the aging AN/SPS-10 radar utilizing Standard Electronic Modules. Contract awarded to produce two AN/SPS-67 preproduction models which have completed testing with service approval granted August 1980. Completed Developmental Testing/Operational Testing of the AN/SPS-49, received Approval for Service Use, and initiated development of AN/SPS-49 Automatic Target Detection. AN/SPS-55 completed Developmental Testing/Operational Testing-III and a field change has been developed and procured to correct deficiencies noted. Completed development and testing of the AN/SPS-48C which incorporates Automatic Detection Track features and commenced development of a New Threat Upgrade modification. Completed at-sea test of the Automatic Target Detection interface of the AN/SPS-40 with Automation Module, AN/SPS-65(V)1 and AN/SPS-52C with AN/UYS-1. Initiated a new display and switchboards. Commenced development of SPS-55 Antenna Pedestal Field Change and an automation module for AN/SPS-67.

2. (U) FY 1982 Program: Continue development of a solid state transmitter for the AN/SPS-40. Complete testing of Automatic Target Detection for AN/SPS-49 and continue testing of AN/SPS-48E for New Threat Upgrade. Continue development of Automation

Project: S0166
Program Element: 64508N
DoD Mission Area: 237-Naval Warfare Surveillance and Reconnaissance

Title: SPS Improvement Program
Title: Radar Surveillance Equipment
Budget Activity: 4 - Tactical Programs

Module for SPS-67 and a Non Naval Tactical Data System Reliability/Maintainability/Availability replacement for existing radar displays and switchboards. Complete testing of AN/SPS-55 antenna improvement field changes and conduct Fleet Operational Test and Evaluation of selected Class B radars to replace the present multiplicity of Type IV surface search radars.

3. (U) FY 1983 Planned Program: Complete Testing of AN/SPS-48E for New Threat Upgrade (NTU) program. Complete development and commence testing the AN/SPS-40 solid state transmitter. Continue development of Reliability/Maintainability/Availability replacement radar displays and switchboards and of SPS-67 Automation Module. Initiate development of an SPS-49 solid state transmitter.

4. (U) FY 1984 Planned Program: Complete development and commence Testing of AN/SPS-67 Automation Module, and the new Reliability/Maintainability/Availability replacement displays and switchboards, and continue development of the SPS-49 solid state transmitter. Commence development of an SPS-48 operational training simulator and of a survivable phase scan antenna for the SPS-49.

5. (U) Program to Completion: Complete development and testing efforts on the AN/SPS-67 Automation Module, Reliability/Maintainability/Availability replacement display and switchboards, AN/SPS-49 solid state transmitter and survivable phase scan antenna and AN/SPS-48 Operational Training Simulator. Develop and test AN/SPS-40 Electronic Counter-Countermeasure improvements, an AN/SPS-49 low Side Lobe Antenna and various Reliability Maintainability Availability improvements. Transition, as appropriate, selected Shipboard Surveillance Radar Systems Program advanced development projects for engineering development to satisfy Operational Requirement (OR), AA-27. Continue to assess the impact of the program on Fleet efficiency and promulgate further development. 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
S0166	SPS Improvement Program	6,452	11,542	6,607	8,269	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64510N
DoD Mission Area: 343 - Theater Communications

Title: Communications Systems
Budget Activity: 4 - Tactical Programs

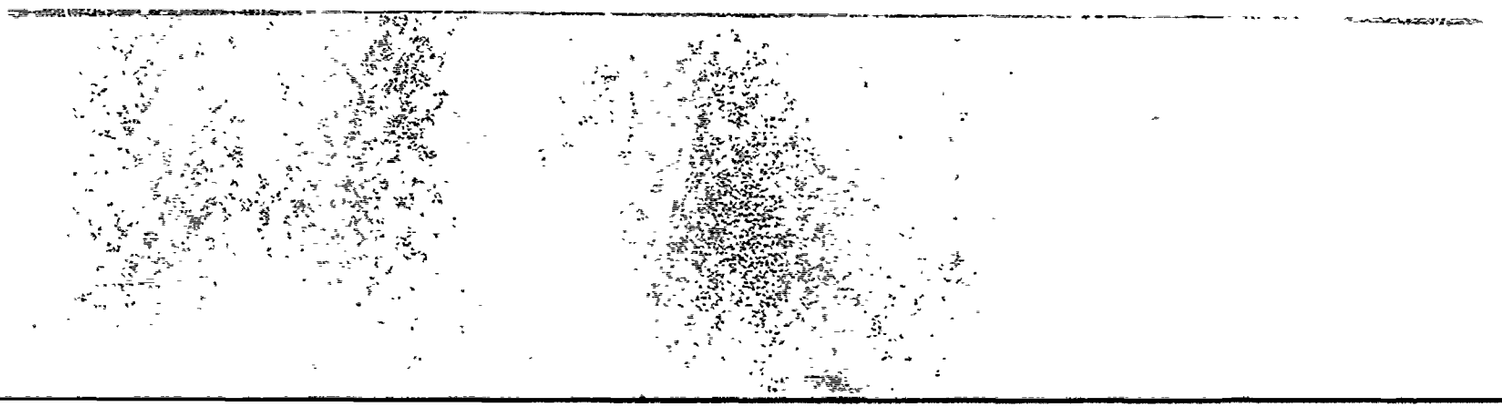
(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

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	5,456	3,178	4,693	238	513	25,286
X0744	Flight Deck Communications	1,783	988	3,399	238	513	16,019
X0960	Compact Very Low Frequency (CVLF)	1,147	2,190	1,294	0	0	5,121
X1099	Worldwide Military Command and Control System Secure Voice/Graphics Conferencing (WWMCCS SV/GC)	2,526	0	0	0	0	4,146

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element funds RDT&E to satisfy varied tactical communications equipment requirements. The Flight Deck Communications Project (X0744) will provide a short range, wire-free, secure voice, Flight Deck Communications system for aircraft capable ships. The Compact Very Low Frequency Project (X0960) will develop a physically compact receiver terminal to increase the reliability of the multichannel very low frequency broadcast in space critical platforms (i.e. submarines).

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Flight Deck Communications funds will complete the building of service test models and prepare for test and evaluation. This project meets a critical fleet requirement. Compact Very Low Frequency will complete development of service test models which began in FY 1982. An increase of 1,515 between FY 1982 and FY 1983 is the result of an increase of 2,411 in Flight Deck Communications (X0744) for the completion of work that had been unfunded and a decrease of 896 in Compact Very Low Frequency (X0960) due to the completion of testing and evaluation. 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: In FY 1981 a decrease of 350 was due to inflation adjustments and an increase of 793 in Flight Deck Communications (X0744) as a result of Navy reprogramming to fund deficiencies, and a decrease of 1,091 in Compact Very Low Frequency (X0960) as a result of reprogramming due to an anticipated delayed award of Full Scale Development contract. In FY 1982 a decrease of 88 was due to inflation adjustments. In FY 1983 an increase of 3,059 is for the completion of unfunded requirements in Flight Deck Communications (X0744) and inflation adjustments. The Total Estimated Cost of the Compact Very Low Frequency Project has decreased by 2,923 due to the above changes in Annual Estimates and projected program completion in FY 1983.



Program Element: 64510N
DoD Mission Area: 343 - Theater Communications

Title: Communications 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	3,885	5,806	3,266	1,634	1,736	35,535
X0743	Distributive Interactive Secure Telecommunications Area Network (DISTAN)	195	0	0	0	0	10,618
X0744	Flight Deck Communications	1,579	990	1,016	304	0	11,408
X0747	Tactical Data Information Exchange System (TADIXS)	1	0	0	0	0	1,267
X0960	Compact Very Low Frequency (CVLF)	490	2,238	2,250	1,330	1,736	8,044
X1099	Worldwide Military Command and Control System Secure Voice/Graphics Conferencing (WWMCCS SV/GC)	1,620	2,578	0	0	0	4,198

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 64510N
Title: Communications Systems
DoD Mission Area: 343 - Theater Communications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Flight Deck Communications System (X0744) provides crypto capable flight deck communications equipment needed to replace old unreliable communications equipment. A four channel secure Flight Deck Communications System will replace the existing single channel flight deck system and non-secure commercial aviation maintenance radio systems. The four channel capability will enable key personnel involved in aircraft operational support functions including aircraft handling, maintenance, fueling, ordnance loading, and crash and salvage operations to have a communications capability through a single system tied into the Emergency Announcing System. Additionally, the system will be specifically designed for use in the extremely noisy environment of a carrier flight deck. Service Test Model quantities being procured will be sufficient to complete Technical Evaluation and Operational Evaluation, the latter requiring a suite of equipment for evaluation aboard an aircraft carrier. A low cost Compact Very Low Frequency receiver terminal is needed to provide partially redundant Minimum Shift Key high data rate modes of the multichannel very low frequency broadcast to submarines. The receiver will support interoperability with NATO/Allied submarines.

(U) RELATED ACTIVITIES: Program Elements 33109N, Satellite Communications; Program Element 63717N, Command and Control Systems (Advanced); Program Element 64711N Command and Control Systems and Program Element 11402N GRYPHON relates to the Compact Very Low Frequency.

(U) WORK PERFORMED BY: In House: Naval Electronic Systems Command, Washington, D.C.; Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Engineering Center, Vallejo, CA. Contractors: GTE Sylvania, Needham, MA; Booz, Allen, and Hamilton, Inc. Bethesda, MD; Rockwell International, Newport Beach, CA; R.M. Vredenburg, McLean, VA; Electrospace, Inc., Dallas, TX; and International Business Machine (IBM) Corporation, Manassas, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Distributed Interactive Secure Telecommunications Area Network Project completed in FY 1980. A message service was developed and a test system was installed at Commander In Chief Pacific Headquarters, Camp Smith, Hawaii, for evaluation. The Military Message Experiment was completed. Work on a follow-on system in the area of security and system architecture which drives the Military Message Experiment was accomplished. The Flight Deck Communications System began in FY 1974, but full scale development was delayed in execution because of funding constraints until the fourth quarter of FY 1976. A cost plus incentive fee contract was awarded in FY 1977. Through FY 1981 four critical design reviews and two interim shipboard tests and a partial build of service test models were completed. Tactical Data Information Exchange System work prior to FY 1978 was accomplished in Program Element 33109N, Satellite Communications, Project X0731, Fleet Satellite Communications. Basic design study and specifications were completed. Navy was tasked to develop software. Development effort and funding support were suspended pending definitization of requirement. Compact Very Low Frequency was a new start in FY 1980. Compact Very Low Frequency full scale development specifications and contract requirements were defined. Surface ship noise measurement program was initiated in FY 1981.

Program Element: 64510N
DoD Mission Area: 343 - Theater Communications

Title: Communications Systems
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Flight Deck Communications: Continue fabrication of Service Test Models. Compact Very Low Frequency: Award development contract for full scale development of submarine compact very low frequency terminal configuration. Continue parallel measurement of surface ship self-noise environment of very low frequencies leading to specification of modification of submarine receiver terminal configuration for deployment on designated surface ships. Define requirements and development schedule for NATO Allied implementation.

3. (U) FY 1983 Planned Program: Complete fabrication of service test models and complete test and evaluation of the Flight Deck Communications System. Complete development and fabrication of 12 Compact Very Low Frequency service test model receivers. Complete surface ship self-noise analysis and prepare specification of modification to receive terminals platform installation requirements for designated surface ships. Complete development of NATO/Allied receive terminal implementation.

4. (U) FY 1984 Planned Program: Complete final engineering changes required as result of operational test and evaluation for Flight Deck Communications Systems.

5. (U) Program to Completion: Flight Deck Communications acquisition strategy will be developed after service acceptance.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64511N
Title: Intelligence Systems
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	2,262	2,708	2,478	5,208	Continuing	Continuing
W0540	Photo Surveillance	2,262	2,708	2,478	5,208	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops and tests all new photographic equipment and other imaging sensors for the Navy, including cameras, films, printers, processors, etc. for aerial, surface and subsurface use. Efforts are being made to advance the Navy's technical capabilities in intelligence collection, image recording devices, pollution abatement, etc. to levels equivalent with current state-of-the-art technology.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development of AS-27A Enhancements, Photographic Image Enhancement and ES-40 Mobile Processing Update. Complete development of Modular Camera Test Set. Continue submarine photo improvement program, Stand-off Camera development, the Automatic Precision Focus System, Test and Evaluation and Approval for Service Use of off-the-shelf equipment. 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 from revision of cost estimates including inflation in FY 1981 and FY 1982 and Navy budget reductions in FY 1983 as follows: FY 1981 - -47, FY 1982 - -37 and FY 1983 - -1,629.

(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 Estimate Cost
	TOTAL FOR PROGRAM ELEMENT	1,674	2,309	2,745	4,107	Continuing	Continuing
W0540	Photo Surveillance	1,674	2,309	2,745	4,107	Continuing	Continuing

Program Element: 64511N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Intelligence Systems
Budget Activity: 3 - 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
	Aircraft Procurement, Navy	5,900	5,900	6,800	7,900	Continuing	Continuing
	Other Procurement, Navy	2,645	2,656	2,577	2,562	Continuing	Continuing

Program Element: 64511N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Intelligence Systems
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for development and test of all photographic and other imaging equipment in the Navy, including cameras, printers, processors, etc., for aerial, surface and subsurface use. System support such as image recording devices, dry and wet processes, film and resolution improvement programs have made quantum jumps in technical capabilities.

(U) RELATED ACTIVITIES: A tri-service informal Research and Development coordinating committee will meet semi-annually to coordinate efforts and monies being expended.

(U) WORK PERFORMED BY: In-house: Naval Air Development Center, Warminster, PA; Naval Air Engineering Center, Lakehurst, NJ; Naval Intelligence Suprort Center, Suitland, MD. Contractor: CAI, Barrington, IL; Zeiss, LaJolla, CA; ITEK, Bedford, MA; Perkin-Elmer, Norwood, CT; Hydro Products, San Diego, CA; ITT, Ft. Wayne IN; Bendix, Mishawaka, IN; Aracor, Bedford, MA; Sperry, Charlottesville, VA; Aerodyne, Bedford, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Initiated development of Modular Camera Test Set and passive Automatic Precision Focus Control. Continued improved submarine photo system with development of mini processor and Test and Evaluation of off-the-shelf equipment. Began development of Stand-off Camera and Photographic Image Enhancement program for under exposed imagery.

2. (U) FY 1982 Program: Continue development of Automatic Precision Focus Control System Photographic Image Enhancement, Modular Camera Test Set and Test and Evaluation of off-the-shelf equipment. Continue development of Stand-off Camera and improved submarine photo capabilities. Begin development of AS-27A Enhancements and ES-40 Mobile Processing Update.

3. (U) FY 1983 Planned Program: Continue development of Automatic Precision Focus Control System, AS-27A Enhancements, Photographic Image Enhancement, submarine photo improvement program, Stand-off Camera and ES-40 Mobile Processing Update. Continue Test and Evaluation and Approval for Service Use of off-the-shelf equipment. Complete development of Modular Camera Test Set.

4. (U) FY 1984 Planned Program: Continue development of Test and Evaluation and Approval for Service Use of off-the-shelf equipment, submarine photo improvement program, and Stand-off Camera. Begin development of Electro-Optic Camera, Shared Focal Plane Camera and Electrostatic Processing. Complete development of Automatic Precision Focus System Photographic Image Enhancement, AS-27A Enhancement and ES-40 Mobile Processing Update.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64515N
DoD Mission Area: 32. Tactical Intelligence and Related Activities Capabilities Development

Title: Submarine Support Equipment Program (Engineering)
Budget Activity: 4 - Tactical Programs

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

Projec. No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT					Continuing	Continuing
X0775	Submarine Support Equipment Program (Sub-Tasks; Quantities)					Continuing (*)	Continuing (*)

* Sub-Tasks and Test Item Quantities are too numerous to tabulate.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will develop and provide capabilities which enable attack class submarines to operate covertly in a hostile electromagnetic environment during direct support, surveillance, barrier and general tactical missions.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue or complete these efforts started in prior years and incrementally funded. Engineering developments include: detection and exploitation equipment, Electronic Warfare Support Measures, Interferometer Direction Finding System, improved Electronic Warfare Support Measures systems; improved photographic systems for the Type 18 periscope. The decrease from FY 1982 to FY 1983 ($4,683 thousand is due to reduction in effort associated with procurement of the two service test models for the DARK EYES system and AN/BRD-7 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) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes between the funding profile shown in the (amended) FY 1982 Descriptive Summary and this Descriptive Summary are as follows: RDT&E,N - (1) FY 1981 funding has increased by 1,974 primarily by reprogramming from the Advanced submarine Surveillance Equipment Program; (2) the FY 1982 estimate has decreased by $741 due to inflation adjustment and minor program revisions. (3) An estimate for the FY 1983 program year has been provided as shown. Other Procurement, Navy - (1) the FY 1981 funding has increased by $,964 due to accelerated procurement of various items. (2) The FY 1982 estimate has increased by 2,100 due to the start of AN/WLO-4 SEA NYMPH electronic support measures depot support. (3) The FY 1983 estimate has decreased by $9,916 due to a one year delay in procurement;

Program Element: 64515N
DoD Mission Area: 324 Tactical Intelligence and Related Activities Capabilities Development

Title: Submarine Support Equipment Program (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	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT				TBD	Continuing	Continuing
X0775	Submarine Support Equipment Program				TBD	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 (Quantities) - Various	11,900	15,200	13,500	45,600	Continuing	Continuing

Program Element: 64515N
Title: Submarine Support Equipment Program (Engineering)
DoD Mission Area: 324 Tactical Intelligence and Related Activities Capabilities Development
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Submarine Support Equipment Program was established to develop and provide sensor and support systems to permit attack submarines to detect, track, identify, and analyze the activities of foreign military systems [redacted] while operating in a hostile electromagnetic environment during surveillance, barrier, and other tactical missions.

(U) RELATED ACTIVITIES: Other service requirements and equipment developments are coordinated through meetings and exchange of reports between the various Department of Defense agencies. Engineering Development in this program draws upon advanced development accomplished under the Advanced Submarine Support Equipment Program, Program Element 63522N, PRAIRIE WAGON, Program Element 31325N which completed development and PRAIRIE SCHOONER, Program Element 31326N. Near-term Radio Direction Finding improvements identified in this Descriptive Summary support long-range cruise missile targeting capabilities for submarines as required by the TOMAHAWK Program (Program Element 64367N, Project X0545).

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Test and Evaluation Detachment, St. Inigoes, MD; Naval Intelligence Support Center, Suitland, MD; Naval Personnel Research and Development Center, San Diego, CA; Naval Research Laboratory, Washington, DC; Naval Electronic Engineering Center, Philadelphia, PA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI. Contractors: S. T. Research Corporation, Fairfax, VA; General Dynamics, Electric Boat Division, Groton, CT; Electromagnetic Systems Laboratory, Sunnyvale, CA; GTE Sylvania, Inc., Mountain View, CA; Hydrotronics, Falls Church, VA and San Diego, CA; Kollmorgen Corp., North Hampton, MA; Watkins-Johnson, Co., Gaithersburg, MD and Sunnyvale, CA; Sanders Associates, Nashua, NH; Bell and Howell, Pasadena, CA; General Research Corp., SWL Division, McLean, VA; Georgia Institute of Technology, Atlanta, GA; Micronetics, San Diego, CA; Systems Consultants, Washington, DC; Hughes Aircraft Co., Culver City, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The following systems have completed development: Types 15 and 18 periscopes; AN/WLR-6 and AN/BRD-7 Electronic Warfare Support Measures Systems; AN/BLA-4, Electronic Warfare Support Measures Antenna System and its subsequent [redacted] of the AN/WLR-6 System; AN/WLR-8(V)2, Electronic Warfare Support Measures System; and Electronic Warfare Support Measures System improvements to the Types 8 and 15 periscopes. Two service test models [redacted] Improvements to the SSN 594 and 637 Class Electronic Warfare Support Measures Suite; periscope improvements including antenna coverage and sensitivity; [redacted] AN/BLD-1 Electronic Warfare Support Measures Interferometer Direction Finding System service test model for SSN 688 class; AN/WLR-[redacted] improvements: AN/BRD-7 improvements [redacted]

Program Element: 64515N
Title: Submarine Support Equipment Program (Engineering)
DoD Mission Area: 324 Tactical Intelligence and Related Activities Capabilities Development
Budget Activity: 4 -- Tactical Programs

2. (U) FY 1982 Program: Continue efforts carried over from FY 1981 program. Expand level of Radio Direction Finding equipment work and [redacted] development. Procure power supplies to improve reliability of AN/WLR-8 system. Develop and test operational training device system for Interferometer Direction Finding System.

3. (U) FY 1983 Planned Program: Continuation of FY 1982 Planned Program. Applicable programs from the Advanced Submarine Surveillance Equipment Program will transition to engineering development in this program element. Decrease in funding from FY 1982 to FY 1983 ($4,683 thousand) is due to reduction in effort associated [redacted] AN/BRD-7 Improvement.

4. (U) FY 1984 Planned Program: Continuation of FY 1983 Planned Program. Complete development of operator aids for submarines not equipped with the AN/WLQ-4 SEA NYMPH electronic warfare support measures system. Develop direction of arrival antenna with [redacted] capability.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64516N
Title: Ship Survivability
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	--	--	4,775	7,809	Continuing	Continuing
S1566	Combat System Prototypes	--	--	4,228	5,576	Continuing	Continuing
S1567	Damage Control Prototypes	--	--	157	466	Continuing	Continuing
S1568	HM&E Systems Prototype	--	--	195	836	Continuing	Continuing
S1569	Total Ship System Prototype	--	--	195	931	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELMENT AND MISSION NEED: Technology base and advanced development efforts for ship survivability improvement is being provided under Program Element 63514N. Emphasis through FY 1986 is an improvement of existing critical subsystems and equipments on designated backfit class surface combatants for survival in conventional warfare; hardening for nuclear survivability is a FY 1983 new start under Program Element 63514N. This program will fill the vital need for completing engineering development of the improvements generated under the technology base programs and will help insure timely fleet introduction of survivability measures.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Combat Systems Prototypes S1566: Continue advanced development of combat system protection mods under Program Element 63514N and transition to engineering development under this project in FY 1983. Complete prototyping of [redacted] engineering development. Damage Control Prototypes S1567: A major fire detector evaluation program is nearing completion in Advanced Development (S0384) and transitioned to engineering development. Complete development of production model of liferaft desalination unit.

(U) HM&E System Prototypes S1568: Development emphasis will be on those single sources and redundant hull, mechanical and electronical systems/equipments that are highly susceptible to simultaneous deactivation from defined threats. Products to detect, control, and mitigate threat damage mechanisms, such as HAVE NAME, fire, smoke, shock, electro-magnetic pulse and flooding, will be developed.

(U) Total Ship System Prototype S1569: Begin construction of full scale [redacted] systems. As this is a continuing program, the above funding profile includes escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 64516N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Survivability
Budget Activity: 4 - Tactical Programs

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: Not applicable. New start.

(U) FUNDING AS REFLECTED IN FY 1982 DESCRIPTIVE SUMMARY: Not applicable. New start.

(U) OTHER APPROPRIATION FUNDS:

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	1,100	5,500	25,700	17,800	9,200	59,300
Quantity						
[redacted]	(85)	(60)	(70)	(53)	(38)	(306)
	-	-	(10)	(8)	(2)	(20)
	(4)	(10)	(12)	(8)	(4)	(38)
	-	-	(23)	(6)	(2)	(31)
	-	-	(30)	(36)	(20)	(86)
	-	-	(6)	(5)	(4)	(15)

Program Element: 64516N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Survivability
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S1566 - Combat Systems Prototypes: Conduct engineering development of hardware mods to increase conventional and nuclear weapons effects protection for surface ship combat systems. Complete development and support initial fleet introduction of protection mods currently in advanced development for combat systems on DD963, DD993, CGN-36/38, CVN-68, LHA-1, and LCC-19 classes. Develop and demonstrate improved combat system hardware hardened to survive specified nuclear weapons effects using [ ]technologies.

S1567 - Damage Control Prototypes: The rapid detection and response to the fire threat on the Navy's capital ships is paramount to their maintaining mission capability. The fire threat represents such aspects of personnel protection as escape in heavy smoke, de-smoking, training for the proper response for a specific fire situation for a specific ship environment. Even though efforts are being made toward fire hardening, fire vulnerable materials will always exist as long as weapons, fuels, and men co-exist on Navy ships. Rapid response to this fire threat is essential. This project provides prototype development of fire protection and Hull/Mechanical/Electrical damage control equipments and systems.

S1568 Hull Mechanical and Electrical: Provide engineering/prototype development of damage-resistant hull/mechanical/electrical systems and equipments. These hull, mechanical and electrical systems are specific to the uninterrupted operational functioning of ship mission areas including mobility, combat, command/control/communications, damage control and underway replenishment. Areas addressed by this effort include propulsion, electrical power, fluid systems, hull, hull machinery, and life support systems. These elements will, however, be designed or design-modified with emphasis on an integrated systems approach. Benefits to be derived from condition monitoring and reconfiguration will be incorporated as appropriate, to maintain continuity of function under all self-inflicted and combat induced threat environments.

S1569 - Total Ship System Prototype: Because of extremely large amounts of ordnance carried in aircraft carriers, a detonation within the magazine would be catastrophic. Such detonations can be caused by threat weapons exploding inside the magazine, weapon fragments penetration or by the physical damage to munitions caused by the shock waves generated by underwater explosions. This program provides for the engineering development, in the form of full scale testing, of [ ] developed in S0384, Program Element 63514N.

(U) RELATED ACTIVITIES: Program Element 63514N S0384, Ship Damage Prevention and Control.

(U) WORK PERFORMED BY: In-House: David W. Taylor, Naval Ship Research and Development Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systes Center, Newport, RI; Naval Surface Weapons Center, Dahlgren, VA; Naval Research Laboratory, Washington, D.C. Contractor: MacDonnell-Douglas, ITT, Hughes, Raytheon.

Program Element: 64516N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Survivability
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments:

Technology base and advanced development efforts for ship survivability were provided under Program Element 63514N.

2. (U) FY 1982 Program:

S1566: Continue advanced development of Combat System protection modifications under Program Element 63514N.

S1567: Continue fire detection evaluation program advanced development under Program Element 63514N.

S1568/S1569: N/A

3. (U) FY 1983 Planned Program:

S1566: Complete prototyping advanced development effort. Transition to

S1567: Complete fire detector evaluation program transition to engineering development. Complete development of production model of liferaft desalination unit.

S1568: Initiate development of those products to detect, control, and mitigate threat damage mechanisms such as fire, smoke, shock, electromagnetic pulse, flooding and fiber release from composite materials.

S1569: Preparations for full scale system tests

4. (U) FY 1984 Planned Program:

S1566: Complete development survivability improvements. Complete operational evaluation of Continue development of surveillance radar improvements. Initiate decision

Program Element: 64516N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Survivability
Budget Activity: 4 - Tactical Programs

S1567: Initiate development of hardware for backfit and of next generation shipboard fire detection system. Complete magazine sprinkler system detection/actuation unit and install aboard ship. Complete prototype development on smoke knockdown coupled with fine water mist suppression system.

S1568: Initiate development of prototype flooding alarm. Develop auxiliary propulsion unit. Initiate development of HAVE NAME detector.

S1569: Conduct full scale system tests.

5. (U) Program to Completion:

S1566: Complete engineering development of cheap kill protection mods to backfit class combat system requirements. Continue development of nuclear hardened topside combat systems.

S1567: Continue development of backfit hardware and more advanced fire detector systems. Develop prototype of fine water mist extinguishing system for shipboard test. Evalute performance of production unit of lifecraft desalination system. Continue development of damage control central trainer/simulator.

S1568: Develop hull, mechanical and electrical condition monitoring and reconfiguration systems/devices. Conduct operational evaluation or redesign, as appropriate, of an auxiliary propulsion unit aboard ship. Demonstrate designs for damage-tolerant hull structures.

S1569: Complete engineering development and conduct full scale demonstrations.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64518N
DoD Mission Area: 353 - Naval Warfare

Title: Combat Information Center (CIC) Conversion
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	5,937	9,420	27,014	23,148	Continuing	Continuing
S0250	Escort Command & Control Systems	4,052	3,330	2,307	891	Contiruing	Continuing
S0251	Data Display System	1,885	580	0	0	0	28,453
S1559	CV/CVN CDS/TDS Upgrade	0	5,510	12,277	10,720	Continuing	Continuing
S1602	CG NTDS Operational Program Upgrade	0	0	2,911	2,791	Continuing	Continuing
S1603	FFG 7 Link 11	0	0	959	0	0	959
S1604	Navy Tactical Data System Software Improvements	0	0	8,560	8,746	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for the development and implementation of advanced automated Tactical Data Systems for surface ships in response to future threats. It has the objective of achieving integrated, coherent ship's Command and Control systems that will increase operational capabilities, promote standardization, and lower system reaction times and life-cycle costs. Included is the modernization and standardization of shipboard tactical displays used for the evaluation of sensor data and for control of aircraft and weapons systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue developmental efforts in Project S0250 Escort Command and Control to provide a Command and Control system to the FF 1052 Class ships. Commencement of the Carrier Combat Direction System Upgrade. The FF 1052 Anti-Submarine Warfare Tactical Data System developmental effort in FY 1983 is as follows: (1) install the equipment suite, including the engineering development model of the target entry unit, the modified signal data converter, and the operational software in the prototype ship; (2) recertify the software in the shipboard environment; (3) complete technical evaluation and operational evaluation by Commander, Operational Test and Evaluation Force; (4) implement software/hardware modifications, if required; (5) obtain approval for service use; (6) initiate engineering refinements of target entry unit; (7) upgrade signal data converter; (8) develop hardware documentation. Continue project S1559, Carrier Combat Direction System/Tactical Data System Upgrade. Continue operational program development. Develop detailed functional design and hardware configuration for Combat Direction System which meets requirements of Carrier Combat System design requirements. Continue software development in accordance with Advanced Combat Direction System concepts. Test and simulation software requirements will be developed. The impact of new functions on Combat Direction System will be determined through studies and modeling. The increase of 6767 thousand over FY 1982 funding in this project is to initiate the engineering development effort and to perform detailed specifications for coding, debugging and operational program testing. Initiate project S1602, Cruiser Naval Tactical Data System Operational Program

Program Element: 64513N
DoD Mission Area: 353 - Naval Warfare

Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

Upgrade. Develop detailed functional design and hardware configuration for the combat direction system which meets CNO requirements. Initiate the Cruiser Naval Tactical Data System operational program development (program performance specifications). Initiate project S1603, FFG 7 Link 11. Design changes to the FFG 7 baseline operational program to provide low cost Link 11 system interface and capabilities similar to FFG 36-49. Initiate Project S1604, Naval Tactical Data System Software Improvements. As a result of recent CNO/Navy Comptroller decisions, Class I "performance envelope" changes will be funded under this project in FY 1983 and beyond instead of the Fleet Modernization Program as was the case in FY 1982 and prior. 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 due to refinement of cost estimates including reduction of escalation indices for FY 1981 (-14) and FY 1982 (-199). The funding increase of 15,975 in FY 1983 is due to the addition of the three new programs, S1602, S1603, and S1604, as well as changes to S1559 which reflect the Navy decision to fund lead ship software with Research and Development funds vice Shipbuilding Construction Navy funds.

(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	4,398	5,951	9,619	11,039	Continuing	Continuing
S0250	Escort Command & Control Systems	2,112	4,044	3,428	2,378	Continuing	Continuing
S0251	Data Display System	2,279	1,907	600	0	0	28,495
S1559	CV/CVN CDS/TDS Upgrade	0	0	5,591	8,661	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 (BA-2)						
Anti-Submarine Warfare Tactical Data System	0	0	0	0	150,000	150,000
S1559 CV/CVN CDS/TDS Upgrade	2,000	5,000	10,036	78,145	163,000	258,181
S1602 CG/CGN NTDS Upgrade	0	0.	6,439	32,100	216,000	254,539

Program Element: 64518N
DoD Mission Area: 353 - Naval Warfare

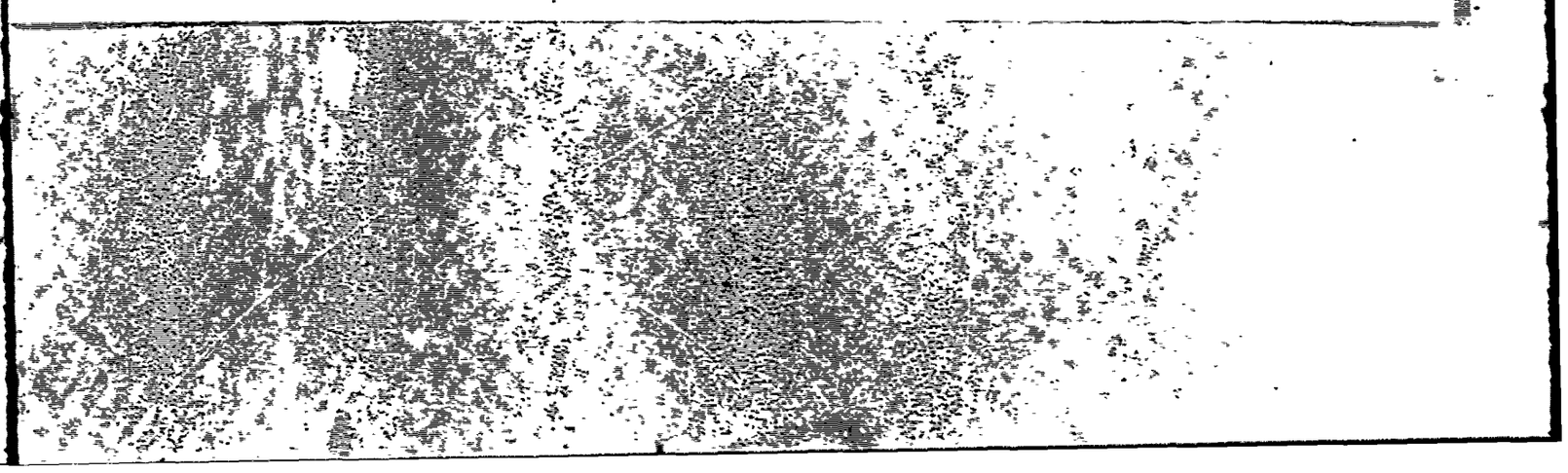
Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program consists of five active projects.

(U) Project S0250: Escort Command and Control is a program to develop an automated Tactical Data System for multiyear installation in escorts. The Tactical Data System will consist of standard Navy computers and associated peripherals, displays, switchboards and interface/conversion equipment. The Tactical Data System will provide escorts with an automated Command and Control function for coordinated employment of the combat system in the ship's primary mission areas as well as supporting the ship's secondary missions. The command and control system supports the gathering of data from the sensor elements, the correlation and evaluation of these data, the processing of these data for transmittal to other ships of the task force, the correlation of data received from other units with own-ship data, the formulation of decisions based on these data, the dissemination of these data to elements of own-ship combat system including the display of a "real-time" tactical presentation to Combat Information Center personnel, and general monitoring of combat system status. The FF-1052 Anti-Submarine Warfare Tactical Data System will be structured to provide automated command support to the prime mission area (Anti-Submarine Warfare) of the ship. This approach reflects the increasing complexity of Anti-Submarine Warfare data correlation, target prosecution by passive sensors, and the difficulty in processing of target motion analysis data. A prototype FF-1052 Anti-Submarine Warfare Data System is planned for installation and evaluation in FY 1982/1983.

(U) Project S1559: All Carrier Combat Direction Systems currently are equipped with obsolete CP-642 computers. The installed computers are "processor saturated", meaning that many routine functions such as surface ship tracking cannot be performed with accuracy in moderate traffic density because the computer is too slow to perform all its required tasks. In addition, 8 carriers have obsolete data display systems with slow data handling rates, limited display range, and poor man-machine interfaces and need to be replaced with modern displays to respond to the threat of the 1990's. The purpose of this project is to design and implement carrier Combat Direction Systems modifications and improvements to correct these deficiencies, to meet new operational requirements and to integrate new capabilities such as: Joint Tactical Information Distribution System, SLQ-17 Electronic Warfare System, Rolling Airframe Missile, etc. Additional objectives include improving reliability and lowering life cycle cost. The development includes sufficient testing to prove feasibility and to evaluate performance. This project encompasses: (1) the application of new conceptual approaches to Combat Direction System functional requirements or implementation architectures developed under program element 63519N; (2) engineering design conducted for new process and data base designs; and (3) system validation through testing prior to platform implementation.

(U) Project S1602: All CG-16/27/36 class cruisers' Combat Direction Systems currently are equipped with obsolete CP-642 computers. The installed computers are "processor saturated". In addition, 9 cruisers have obsolete data display systems with slow data handling rates, limited display range, and poor man-machine interfaces and need to be replaced with more modern UYA-4 displays to respond to the threat of the 1990's. All other cruisers' data display systems require UYA-4 display equipment modifications to ensure adequate display capability suitable for the service life of these platforms. The purpose of this project is to design and implement cruiser Combat Direction System modifications and improvements to correct these deficiencies, to meet



new operational requirements and to integrate new capabilities such as: Joint Tactical Information Distribution System, Over-the-Horizon Targeting, etc. Additional objectives include improving reliability and lowering life cycle cost. The development includes sufficient testing to prove feasibility and to evaluate performance. This project encompasses (1) the application of new conceptual approaches to Combat Direction System functional requirements or implementation architectures developed under program element 63519N; (2) engineering design conducted for new process and data base designs; and (3) system validation through testing prior to cruiser platform implementation.

(U) Project S1603: This project modifies the FFG 7 Class operational program to implement an interface with the low cost Link 11 system. The requirement exists to backfit the Link 11 system in the FFG 7-34 ships. This requires two major modifications to the FFG 7 Class operational programs.

(U) Project S1604: Naval Tactical Data System Software Improvements is a project to design and develop Combat Direction System computer program changes required to support product improvements resulting from the implementation of Class I Engineering Change Proposals and Combat Direction System equipment enhancements. The Class I Engineering Change Proposals cover performance envelope changes to existing surface combatant, carrier, LCC, and LHA Combat Direction System computer programs based on operational inputs from fleet users. The Combat Direction System equipment enhancements cover the planned installation of Digital Data Indicators, Console Internally Generated and Refreshed Symbology, additional displays, printers, additional computers/memories, etc., in existing Combat Direction System ships during regular overhauls or Selected Restricted Availabilities.

(U) RELATED ACTIVITIES:

(U) Project S0250: Escort Command and Control Systems development (hardware and software) will use much of the design data base established by the FY 1968-1972 development and subsequent installation of the Junior Participating Tactical Data System on th DDG 9, 12, 15, and 21. The FF-1052 Anti-Submarine Warfare Tactical Data System will utilize the display system being develope under project S0251.

(U) Project S1559: Carrier Combat Direction System Upgrade will use work performed in PE 63519N, Advanced Command Data System, to ensure the development is optimized for proper operation in the modern, high speed, multi-threat tactical environment.

(U) Project S1602: Cruiser Combat Direction System Upgrade will apply the advanced design concepts developed under the Advanced Command Data Systems project, program element 63519N. The work accomplished under the Carrier Combat Direction System Upgrade project, Program Element 64518N, S1559, where possible, will be extended to the Cruiser Combat Direction System Upgrade.

(U) Project S1603: FFG 36 through FFG 49 will be delivered with an integrated Light Airborne Multi Purpose System, SH-32 Link 11 communications system.

Program Element: 64518N
DoD Mission Area: 355 - Naval Warfare

Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

(U) Project S1604: Not applicable.

(U) WORK PERFORMED BY: In-House: Project S0250: Naval Sea Systems Command (lead activity), Washington, DC; Fleet Combat Direction Systems Support Activity, Dam Neck, VA; Puget Sound Naval Shipyard (Code 191), Bremerton, WA; Naval Ocean Systems Center, San Diego, CA; Naval Tactical Data System Development and Evaluation Site, Mare Island, CA. Project S1559: Naval Sea Systems Command (lead activity), Washington, DC; Naval Ocean Systems Center, San Diego, CA; Fleet Combat Direction Systems Support Activity, San Diego, CA; Puget Sound Naval Shipyard (Code 191), Bremerton, WA. Project S1602: Naval Sea Systems Command (lead activity), Washington, DC; Naval Ocean Systems Center, San Diego, CA (lead lab); Fleet Combat Direction Systems Support Activity, Dam Neck, VA. Project S1603: Naval Sea Systems Command, Washington, DC; Fleet Combat Direction Systems Support Activity, Dam Neck, VA. Project S1604: Naval Sea Systems Command, Washington, DC; Fleet Combat Direction System Support Activities, Dam Neck, VA and San Diego, CA; Naval Tactical Data System Development and Evaluation Site. Vallejo, CA. Contractors: Project S0250: Computer Sciences Corp., Moorestown, NJ; Vitro Laboratories, Silver Spring, MD; Raytheon Service Co., Arlington, VA; Comptek Research, Inc., Buffalo, NY; UFTE, Inc., Arlington, VA. Project S1559: Vitro Laboratories, Silver Spring, MD; Raytheon Service Company, Arlington, VA; Hughes Aircraft Company, Fullerton, CA; SEMCOR, Arlington, VA; Comptek Research, Inc., Buffalo, NY; Sperry Univac, St. Paul, MN; others to be determined. Project S1602: Vitro Laboratories, Silver Spring, MD; Hughes Aircraft Company, Fullerton, CA; SEMCOR, Arlington, VA; Comptek Research, Inc., Buffalo, NY; Sperry Univac, St. Paul, MN; others to be determined. Project S1603: To be determined. Project S1604: Computer Science Corporation, San Diego, CA; System Development Corporation, Virginia Beach, VA; Comptek Research, Inc., Buffalo, NY; Sperry Univac, St. Paul, MN; Vitro, Silver Spring, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments:

(U) Project S0250: The definition of the DDG Combat System was finalized in December 1975 and hardware was procured. In FY 1976, a multiyear contract was negotiated with Sperry Univac to develop operational, simulation, and test program software for the DDG-Target Designation System. In FY 1977, Program Performance Specifications were developed and approved for the DDG-Target Designation System software. In FY 1978, DDG-Target Designation System Program Design Specifications were completed. The program was coded and contractor verification testing started. In FY 1979, DDG-Target Designation System program completed contractor testing and commenced Navy certification testing. System studies defining alternative cost and capability options for a FF1052 Command and Control system were conducted in FY 1977. In FY 1978, an Anti-Submarine Warfare oriented system with a hardware procurement cost of $1.5 million per ship suite was selected. In FY 1979 the Acquisition Plan, Program Description, draft of Request For Proposals including the Program Request and Contractor Data Requirements List, and an Anti-Submarine Warfare Tactical Data System specification were developed; and government-furnished equipment was procured for the Engineering Development Models. In FY 1980 a request for proposals was issued; proposals were evaluated. Computer Sciences Corporation was selected as the prime contractor, and system development commenced at Moorestown, NJ and at Naval Tactical Data System Development and Evaluation Site, Mare Island,

Program Element: 64518N
DoD Mission Area: 353 - Naval Warfare

Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

CA. In 1981 projected cost escalation of the equipment suite by the prime contractor required modification of the development effort to ensure procurement costs would meet funding goals. Naval Ocean Systems Center, San Diego was tasked to acquire substitute peripherals to satisfy system requirements. The prime contractor continued development of operational and simulation computer programs and retained responsibility for system integration. Computer program performance and design specifications were delivered.

(U) Project S0251: A competitive contract was awarded to Hughes Aircraft Com[illegible]n February 1973 to develop/fabricate the AN/UYQ-21([illegible], equipment. Fabrication of Phase I hardware was completed by th[illegible] 1975. Technical Evaluation was conducted from early 1976 to July 1977. Engineering Development Models of the standard console (acoustic version) were delivered in 1976 and 1977 for use in system development by Surface Ship Sonar Modernization Program, Tactical Towed Array Sonar, Light Airborne Multipurpose System, Tactical Flag Command Center, Anti-Submarine Warfare Fire Control and for operational demonstration of the Tactical Data System Console. Training of operator and maintenance personnel, debug of the operational program and technical evaluation of the equipment and documentation required for the operational evaluation of the Tactical Data System version of the standard console was conducted during 1978. Equipment was installed on the Operational Evaluation ship, USS Fanning (FF1076), and an at-sea technical evaluation was conducted in late 1978. Operational Evaluation commenced February 1979 and was successfully completed in April 1980. Provisional approval for service use of the core equipment and limited production for CVN-71 and the advanced Combat Direction System land based test site equipment was obtained based on Commander, Operational Test and Evaluation Force's recommendation. During FY 1979 breadboard large screen displays were delivered for program development for AEGIS. During FY 1980 technical evaluation testing commenced on militarized large screen display units at Naval Ocean Systems Center, San Diego, CA. In FY 1981 operational evaluation commenced on acoustic consoles on USS MC INERNEY (FFG-8). Technical evaluation on the militarized large screen display was completed.

(U) Project S1559: New start in FY 1982.

(U) Project S1602: New start in FY 1983.

(U) Project S1603: New start in FY 1983.

(U) Project S1604: New start in FY 1983.

2. (U) FY 1982 Program:

(U) Project S0250: DDG-Tactical Data System integration testing will be completed, and the program will be turned over to the Life Cycle Maintenance activity. The FF-1052 Anti-Submarine Warfare Tactical Data System hardware will be installed at the land base test site; program coding demonstration, debug, and certification will be completed; and the hardware will be delivered to

the installation shipyard for installation in the FF-1052 class prototype ship.

(U) Project S0251: Complete acoustic console operational evaluation on USS MC INERNEY (FFG-8). Continue environmental testing of militarized large screen display at Hughes Aircraft Company. Continue development of Integrated Logistic Support Documentation. Continue test and evaluation of deficiency corrections. Continue depot support plans. Continue development of field changes for interface of non-UYQ-21 equipment (i.e. UYA-4 signals simulator and video processor.)

(U) Project S1559: Develop detailed functional requirements and system design specifications for carrier Combat Direction System Improvement. Initiate software development (performance specifications) in accordance with Advanced Combat Direction System concepts. Develop test and simulation software requirements. Determine impact of new functions on the Combat Direction System through studies and modeling.

(U) Project S1602: New start in FY 1983.

(U) Project S1603: New start in FY 1983.

(U) Project S1604: New start in FY 1983.

3. (U) FY 1983 Planned Program:

(U) Project S0250: Install equipment suite and operational software in prototype ship. Recertify software in shipboard environment. Complete technical evaluation and operational evaluation. Implement software/hardware modifications, if required. Obtain provisional approval for service use. Initiate engineering refinements of target entry unit, upgrading of signal data converter, and hardware documentation development.

(U) Project S0251: Project completed.

(U) Project S1559: Continue detailed design of hardware configuration and software. Initiate development site preparations. Continue software performance specifications and commence design specifications.

(U) Project S1602: Initiate cruiser Naval Tactical Data System Upgrade project. Develop detailed functional design and hardware configuration for the combat direction system which meets Chief of Naval Operations operational requirements and cruiser combat system design requirements. Initiate the cruiser Naval Tactical Data System operational program development (program performance specifications).

Program Element: 64518N
DoD Mission Area: 353 - Naval Warfare

Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

(U) Project S1603: Initiate design changes to the FFG 7-37 baseline operational program to provide low cost Link 11 system interface and capabilities similar to FFG 36-49.

(U) Project S1604: Implement Class I "performance envelope" Engineering Change Proposals in the Combat Direction System computer programs approved by various ship class software change control boards. Initiate the development of Combat Direction System computer program changes for equipment enhancements.

4. (U) FY 1984 Planned Program:

(U) Project S0250: Finalize refinements of target entry unit and upgrading of signal data converter. Complete hardware documentation development. Finalize software modifications. Initiate integrated logistic system development.

(U) Project S1559: Complete software design specifications and initiate program code and debug. Initiate acceptance and integration test procedure development.

(U) Project S1602: Continue detailed functional design and hardware configuration for the cruiser combat direction system. Continue cruiser Naval Tactical Data System operational program software development. Complete program design specifications and initiate program code and debug.

(U) Project S1603: Complete design and deliver lead ship operational program changes.

(U) Project S1604: Continue implementation of software change control board approved Class I "performance envelope" Engineering Change Proposals and Combat Direction System equipment enhancements.

5. (U) Program to Completion:

(U) Project S0250: Complete integrated logistic system development. Retest system with new hardware. Install new hardware suite in FF 1052 class ship. Complete follow-on test and evaluation. Obtain approval for service use. Continue efforts as in previous years for other classes of escorts.

(U) Project S0251: Project funding completed in FY 1982.

(U) Project S1559: Conduct test and certification of Tactical Data System software. Combat Direction System integration into Carrier Combat System. Integration and verification of new functions and interfaces.

Program Element: 64518N
DoD Mission Area: 353 - Naval Warfare

Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

(U) Project S1602: Complete development, evaluation, and test and certification of Advanced Combat Direction System Engineering Development Model and integration into cruiser combat system.

(U) Project S1604: Continue the implementation of software change control board approved Class I "performance envelope" Engineering Change Proposals and Combat Direction System equipment enhancements.

6. (U) Milestones: Not applicable.

Project: S1559 Title: Carrier Combat Direction System/Tactical Data System Upgrade
Program Element: 64518N Title: Combat Information Center (CIC) Conversion
DoD Mission Area: 353 - Naval Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The purpose of this project is to design the software for Carrier Combat Direction Systems in Fleet Aircraft Carriers as part of the Carrier Naval Tactical Data System Upgrade. The modifications and improvements will correct existing deficiencies, meet new operational requirements and provide the capability to integrate new systems such as the Joint Tactical Information Distribution System, SLQ-17 Electronic Warfare System, Rolling Airframe Missile, etc. Additional objectives include improving reliability and lowering life cycle cost. The development includes sufficient testing to prove feasibility and to evaluate performance. This project encompasses: (1) the application of new conceptual approaches to Combat Direction System functional requirements or implementation architectures developed under Program Element 63519N; (2) engineering design conducted for new process and data base designs; and (3) system validation through testing prior to platform implementation.

(U) RELATED ACTIVITIES: Project S0251, Data Display System develops the AN/UYQ-21, the next generation surface Navy standard data display system which will be used in the Carrier Naval Tactical Data System Upgrade; Program Element 63519N Advanced Combat Data System provides the advanced design concepts for the Carrier Naval Tactical Data System Upgrade; Program Element 25604N; Joint Tactical Information Distribution System; Program Element 64361N, NATO SEA SPARROW; and other functional interfacing systems are also related.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC (lead activity); Naval Ocean Systems Center, San Diego, CA (lead laboratory); Fleet Combat Direction Systems Support Activity, San Diego, CA; Puget Sound Naval Shipyard (Code 191), Bremerton, WA; Integrated Combat Systems Test Facility, San Diego, CA. Contractors: Vitro Laboratories, Silver Spring, MD; Raytheon Service Company, Arlington, VA; Hughes Aircraft Company, Fullerton, CA; SEMCOR, Arlington, VA; Comptek Research Inc., Buffalo, NY; Sperry Univac, St. Paul, MN; others to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This project begins in FY 1982, building upon previous work, especially Program Element 63519N.

2. (U) FY 1982 Program: Carrier Combat Direction System Upgrade specification and Test and Evaluation Master Plan will be completed in FY 1982. Initial task will be the development of detailed functional design and hardware configuration for a Combat Direction System which meets requirements of Chief of Naval Operations Operational Requirements and Carrier Combat System Design Requirements. Software design (performance specifications) in accordance with Advanced Combat Direction System (Program Element 63519N) concepts will be initiated. Test and simulation software requirements will be developed. The impact of new functions on Combat Direction System will be determined through studies and modeling.

Project: S1559 Title: Carrier Combat Direction System/Tactical Data System Upgrade
Program Element: 64518N Title: Combat Information Center (CIC) Conversion
DoD Mission Area: 353 - Naval Warfare Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Continue detailed design of hardware configuration and software. Initiate development site preparation. Complete software performance specifications and commence design specifications.

4. (U) FY 1984 Planned Program: Complete software design specifications and initiate program coding and debugging. Initiate acceptance and integration test procedure development.

5. (U) Program to Completion: Complete development and evaluation of Combat Direction System Engineering Development model. Certify Combat Direction System Engineering Development Model software. Conduct Combat Direction System integration into Carrier Combat System. Complete verification and validation of new functions and interfaces. Conduct land based acceptance testing in FY 1986 and FY 1987. Conduct operational evaluation 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
S1559	CV/CVN CDS/TDS Upgrade	0	5,510	12,277	10,720	Continuing	Continuing

Project: S1604 Title: Naval Tactical Data System Software Improvements
Program Element: 64518N Title: Combat Information Center (CIC) Conversion
DoD Mission Area: 353 - Naval Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Design and develop Combat Direction System computer program changes required to support product improvements resulting from the implementation of Class I Engineering Change Proposals and Combat Direction System equipment enhancements. The Class I Engineering Change Proposals cover performance envelope changes to existing surface combatant, carrier, LCC, and LHA Combat Direction System computer programs based on operational inputs from fleet users. The Combat Direction System equipment enhancements cover the planned installation of Digital Data Indicators, Console Internally Generated and Refreshed Symbology, additional displays, printers, additional computers/memories, etc. in existing Combat Direction System ships during regular overhauls and Selected Restricted Availabilities.

(U) RELATED ACTIVITIES: Not Applicable.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC; Fleet Combat Direction System Support Activities at Dam Neck, VA, and San Diego, CA; Naval Tactical Data System Development and Evaluation Site, Vallejo, CA. Contractors: Computer Science Corporation, San Diego, CA; System Development Corporation, Virginia Beach, VA; Comptek Research, Inc., Buffalo, NY; Sperry Univac, St. Paul, MN; VITRO, Silver Spring, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

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

2. (U) FY 1982 Program: Not applicable.

3. (U) FY 1983 Planned Program: Implement Class I "performance envelope" Engineering Change Proposals in the Combat Direction System computer programs approved by various ship class software change control boards. Initiate the development of Combat Direction System computer program changes for equipment enhancements such as Data Display Indicators in DDG 993 Class, CG 26, CGN 38 Class, and LHA 1 Class; Console Internally Generated and Refreshed Symbology in DD 963 Class, DDG 993 Class, and FFG 7 Class; Amphibious Support Information System in LCC 19 Class; Aircraft Carrier Anti-Submarine Warfare Module in cruisers.

4. (U) FY 1984 Planned Program: Continue the implementation of software change control board approved Class I "performance envelope" Engineering Change Proposals and Combat Direction System equipment enhancements.

5. (U) Program to Completion: Continue the implementation as stated in paragraph 4.

6. (U) Milestones: Not applicable.

Project: S1604
Program Element: 64518N
DoD Mission Area: 353 - Naval Warfare

Title: Naval Tactical Data System Software Improvements
Title: Combat Information Center (CIC) Conversion
Budget Activity: 4 - Tactical Programs

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
S1604	Naval Tactical Data System Software Improvements	0	0	8,560	8,746	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (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	0	29,674	85,937	137,515	Continuing	Continuing
S1347	Submarine Advanced Combat System (Engineering)	0	29,674	84,207	131,882	1,099,488	1,345,251
	(Quantities) 1/	(0)	(0)	(1/)	(0)	(1/)	(1/)
X1411	Attack Submarine Integrated Communication System	(0)3/	(5,810)3/	1,730	5,633	Continuing	Continuing
	(Quantity - Engineering Development Models	(6)2/					(6) 2/
	- Sensor Interface Unit	(6)2/					(6) 2/
	- Submarine Tactical Data Link System	(3)2/					(3) 2/
	- Secure Switch	(3)2/					(3) 2/
	- Submarine Keyboard Printer)						

1/ The Descriptive Summary for Program Element 63504N, Project S0223 identifies test items for the Submarine Active Detection Sonar development transitioning to this program in FY 1983. Other critical items will be identified during the FY 1982 concept development competition. A single contractor will integrate all elements.
2/ Development/Operational Test and Evaluation. These test items were procured in FY 1981 under Program Element 63520N.
3/ FY 1981 and prior effort was funded in project X0712 of Program Element 63520N (Advanced Communications). FY 1982 funding for this project is contained in Program Element 64505N. The FY 1982 estimate, repeated here for convenience, does not contribute to the Program Element total in FY 1982.

(U) BRIEF DESCRIPION OF ELEMENT AND MISSION NEED: This element provides for engineering 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 in land-attack

Advanced Combat System: The Submarine Advanced Combat System Development program is structured in two phases. The basic development effort will deliver systems for installation } which embody those improvements which can be incorporated in that time frame. The follow-on development consists of continuing analysis and evolutionary introduction of improvements which meet the needs of attack and strategic submarines. The basic system architecture will be specifically designed to readily accommodate growth capabilities. Analysis and early development will drive the combat system related part } Advanced development of the Submarine Advanced Combat System Program will be performed under Program Element S1347 Submarine

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Engineering)
Budget Activity: 4 - Tactical Programs

63524N. X1411 Attack Submarine Integrated Communications Systems: The communications support function is among the most important which must be accomplished by the Attack Submarine in the performance of missions against any threat. The long term objective of this program is to develop an Integrated Communications System which will provide an improved internal and external information transfer system that is reliable, flexible, and timely; is more conducive to communications at will; contributes to overall attack submarine combat system effectiveness, and interfaces effectively with other command and control subsystems. The near term objective update of existing radio rooms on a continuing basis, is essential to maintain a communications capability which meets the needs of present and future operational requirements. Currently, the highest priority task in the project is the Data Link Communication System which supports TOMAHAWK Over-the-Horizon Targeting in attack submarines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S1347 Submarine Advanced Combat System: Full Scale Development of the Combat Control/Acoustic subsystems will be initiated. Computer program performance specifications will be developed and reliability and maintainability plans and prediction reports will be finalized. Combat Control/Acoustic subsystem critical item validation will be completed and unit design initiated. The following Combat Control/Acoustic subsystems Government Furnished Equipment will continue full scale development: Submarine Active Detection Sonar (having transitioned from Program Element 63504N, project S0223, Submarine Sonar Advanced Development) and the Navigation Plotter/Combat Summary Display. X1411 Attack Submarine Integrated Communications System: The majority of the FY 1983 funding is for the Data Link Communication System which supports the TOMAHAWK Over-the-Horizon Targeting Program scheduled for a mid-1982 initial operational capability. 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 (amended) Descriptive Summary and this Descriptive Summary are as follows: RDT&E - (1) The FY 1982 estimate has decreased by 4,200 due to transfer of project X1411 to Program Element 64505N (FY 1982 only) (-3,600) and revised inflation factors in project S1347 (-600). (2) FY 1983 estimates for the program element and its projects have been provided as shown. (3) The total cost of the Submarine Advanced Combat System Full Scale Engineering Development program has been estimated as shown. Other Procurement, Navy - (1) 1,000 in FY 1981 funds have been added in Program Element 24281N for procurement of Sensor Interface Unit and Submarine Tactical Data Link training equipment to support the submarine initial operating capability for the TOMAHAWK missile. (2) The FY 1983 estimate has increased by 6,683 to reflect revisions in installation plans for the submarine launched TOMAHAWK missile capability, requiring increased annual procurements of Data Link Communication System equipment.

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (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	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	33,374	TBD	TBD	TBD
S1347	Submarine Advanced Combat System	0	0	30,274	TBD	TBD	TBD
	(Sub-Tasks; Quantities)	(*)	(*)	(*)	(*)	(*)	(*)
X1411	Attack Submarine Integrated Communication System	0	0	3,600	TBD	TBD	TBD
	(Quantity - (Engineering Development Models)						
	- Sensor Interface Unit			(**)			(6)
	- Submarine Tactical Data Link System			(**)			(6)
	- Secure Switch			(**)			(3)
	- Submarine Keyboard Printer)			(**)			(3)

* The Descriptive Summary for Program Element 63504N, project S0223 identifies test items for the Submarine Active Detection Sonar development transitioning to this Program Element in FY 1982. Other critical items will be identified during the FY 1981 concept development competition. A single contractor will integrate all elements.

**Development/Operational Test and Evaluation.

(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	(1,000)**	(7,900)*	12,734	6,233	Continuing	Continuing

* Repeated, for convenience, from the Descriptive Summary for Program Element 64505N.
** This funding is contained in Program Element 24281N (Submarines).

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S1347 Submarine Advanced Combat System (Engineering): 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 and capabilities needed to counter the projected threat beyond the 1980s without major changes in hardware and software. New hardware technology and new improvements in combat system capacity 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 AN/WLQ-4 SEA NYMPH Electronics Warfare System, now in production; the Attack Submarine Integrated Communication system, scheduled to begin advanced development in 1984; the AN/UYS-2 (XN-1)(V) Enhanced Modular Signal Processor, scheduled for advanced development in 1982; and standard Navy minicomputers such as the AN/UYK-43 and AN/UYK-44. Within the constraints of this 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 improvements. 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 their 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 and will be constrained to using the sensor arrays and weapon launch/handling systems planned for these ships. Follow-on developments will consist of the incremental upgrading of the initial system with those capabilities found by continuing threat analyses to be necessary. This effort will build on the initial 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. X1411 Attack Submarine Integrated Communications System: The present attack submarine communications suite has evolved piecemeal around equipments designed explicity for or adapted to specific submarine communications needs. Acoustic communication facilities have not been integrated and space, weight and power requirements have not been adequately optimized. Additionally, existing communication suite configurations do not have the growth potential to support attack submarine mission requirements of the 1990s and beyond. The purpose of this program is to provide these requirements in a new system design, accomplished through integration, human engineering and the utilization of prior technoiogical achievements in radio room engineering, e.g., distributed microprocessors and automated message handling. The Integrated Communication System will not be ready for any attack submarine hull for those existing attack submarines the Data Link Communications system is being developed to meet the communication needs o the TOMAHAWK/Over-the-Horizon Targeting System. To fulfill TOMAHAWK initial operating capability schedule requirements.

six Sensor Interface Units, six Submarine Tactical Data Link systems, three secure switches and three Submarine Keyboard Printers have been procured for development/operational test and evaluation. One of each of the above equipments will be installed in the Combat Control System Integration Program facility at the Naval Underwater Systems Center and on USS LA JOLLA (SSN 701) and USS ATLANTA (SSN 712). The remaining equipments will undergo maintainability, reliability and environmental testing to support approval for service use.

(U) RELATED ACTIVITIES: S1347 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 this program. 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). Other related programs include:

Program Element	Program Element
24163N, project X0695, High Frequency Improvement	63590N, Wide Aperture Array (Advanced)
24281N (All Projects), Submarines	63708N, project S0823, Acoustic Performance Prediction
31325N, PRAIRIE WAGON	64502N, Submarine Integrated Antenna System
33109N, project X0731, Fleet Satellite Communications	64503N, Submarine Sonar Development (Engineering)
62633N, SF 33-341, Undersea Weapons Guidance and Control	64507N, Enhanced Modular Signal Processor
62721N, XF 21-221, Tactical Acoustic Communications	64514N (All Projects), Navigation Systems
63503N, Acoustic Communications (Advanced)	64515N, Submarine Surveillance Equipment Program
63504N (All Projects), Submarine Sonar Development (Advanced)	64524N, project X1411, described herein
63509N, project S0248, Shipboard Data System	64562N (All Projects), Submarine Tactical Warfare Systems (Engineering)
63530N, project X0798, Over-the-Horizon Targeting	64566N, Acoustic Communications (Engineering)
63562N, project S0210, Submarine Acoustic and Torpedo Countermeasures and S1686, Attack Submarine Combat Control Systems Improvement (Advanced)	

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Engineering)
Budget Activity: 4 - Tactical Programs

X1411 Attack Submarine Integrated Communications System: Integrated submarine antenna and radio frequency distribution systems are developed under Program Element 64502N, Submarine Communications. The Attack Submarine Integrated Communications system will be part of the Submarine Advanced Combat system being developed under Program Element 63524N and 64524N. The test item procurements described above support the submarine initial operating capability schedule for the TOMAHAWK missile system (Program Element 64367N).

(U) WORK PERFORMED BY: In-House: The Naval Sea Systems Command, Washington, DC has the responsibility of overall program management and for development and procurement of those system elements associated with acoustic and combat-control capabilities. 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; and Naval Research Laboratory, Washington, DC. Contractors: S1347 - EG&G, Washington Analytic Services Center, Rockville, MD has been selected competitively to support planned Submarine Advanced Combat System engineering and integrated activities. The prime contractor for the Submarine Advanced Combat System Combat Control/Acoustic subsystem will be selected by mid-FY 1982. X1411 - Computer Science Corporation, Falls Church,VA; Magnavox, Philadelphia, PA; AMEX, Hawthorne, CA; R. M. Vredenburg, McLean, VA; AVW, Inglewood, CA and three others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S1347 Submarine Advanced Combat System: FY 1982 new start. The top-down analytical effort and engineering studies which form the basis of the program were initiated under other programs and defined under the Submarine Advanced Combat System advanced development program (program element 63524N). X1411 Attack Submarine Integrated Communications System: FY 1981 and prior effort was conducted in project X0712 of Program Element 63520N (Advanced Communications).

2. (U) FY 1982 Program: S1347 Submarine Advanced Combat System: Initiate unit design for Submarine Active Detection Sonar, develop solicitation documents and award a receive subsystem full scale development contract. Continue full scale development of the subsystem initiated under Program Element 63524N, project S1346, Submarine Advanced Combat System (Advanced). Develop computer program performance specifications and finalize reliability and maintainability plans and prediction reports. Complete Submarine Active Detection Sonars Receive Subsystem unit specifications. Complete critical item validation and initiate unit design for the Combat Control/Acoustic subsystem. Continue full scale development of the Submarine Active Detection Sonar and the Navigation Plotter/Combat Summary Display. X1411 Attack Submarine Integrated Communication System: Refer to the Descriptive Summary for Program Element 64505N.

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Engineering)
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: S1347 Submarine Advanced Combat System: Initiate full scale development of the Combat Control/Acoustics subsystem. All necessary experimental work will have been performed and the Combat Control/Acoustic Subsystem will be ready for full scale development. Complete critical item validation and initiate unit design for the Combat Control/Acoustic subsystem. Continue full scale development of the Submarine Active Detection Sonar and the Navigation Plotter/Combat Summary Display. Increase in funding from FY 1982 to FY 1983 reflects the start of the Combat Control/Acoustic Subsystem engineering development effort. X1411 Attack Submarine Integrated Communication System: In-house effort initiated under Program Elements 63520N and 64505N will be continued. The test and evaluation of the Data Link Communication System will occur and the preparation of a procurement package for the Data Terminal set and the Sensor Interface Unit will be completed. Decrease in funding from FY 1982 (Program Element 64505N) to FY 1983 reflects reduced development activity associated with procurement Data Link Communication Systems.

4. (U) FY 1984 Planned Program: S1347 Submarine Advanced Combat System: Complete the Combat Control/Acoustic subsystem unit design, initial design/code and software module test. Develop the computer program design specifications and conduct the critical design review. Initiate product improvement program and update life cycle cost documentation, and test and evaluation master plan. Finalize the test requirements specifications, initiate and complete unit design for displays and combat controls and finalize the unit design for acoustic and weapons controls. Initiate all software design and implementation programs and test and integration procedures for unit test beds/facilities and the software modular tests. Continue full scale development of supporting government furnished equipment. X1411 Attack Submarine Integrated Communication System: Continue the development, fabrication and test and evaluation of the Data Link Communication System and prepare technical packages to support the production conracts for this equipment. Commence development of the Integrated Communication System. Select a prime contractor t begin full scale development.

5. (U) Program to Completion: S1347 Submarine Advanced Combat System: The full scale development effort will provide an engineering development model, lead ship system, maintenance trainer, operator trainer and team trainer. Approval for service use is planned for FY 1993. The lead ship system and maintenance trainer will be funded by Ship Construction, Navy Funds. X1411 Attack Submarine Integrated Communication System: This is a continuing program.

6. (U) Milestones:

a. (S1347) Submarine Advanced Combat System		Date
(1) Critical Item Tests	(June 1981 - August 1982)*	April 1982 - July 1983
(2) Defense Systems Acquisition Review Council - Milestone I/II (Decision Coordinating Paper revised)	(May 1982)*	February 1983
(3) Phase - I Transition to Full-Scale Engineering Development Award Full-Scale Development Contract	(May 1982)*	March 1983

Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Engineering)
Budget Activity: 4 - Tactical Programs

	Date	
b. (X1411 Attack Submarine Integrated Communications System		
(1) Award Demonstration and Validation Contracts	(July 1982)*	
(2) Award Full Scale Development Contract	(October 1983)*	
(3) Data Link Communication System Approval for Service Use		March 1986
(4) Commence Subsystem Integration and Certification		June 1984
(5) Deliver to System Integration Site	(June 1985)*	
(6) Deliver Lead Ship Model	(July 1987)*	
	(March 1988)*	

*Milestones shown on FY 1982 Descriptive Summary. Milestones 6a(1)-(3) and 6b(2) delayed due to program restructuring. Milestones 6b(1), and 6b(4)-(6) deleted due to program restructuring. Milestone 6b(3) was not shown in the FY 1982 Descriptive Summary.

Project: S1347 Title: Submarine Advanced Combat System (Engineering)
Program Element: 64524N Title: Submarine Advanced Combat Systems (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare 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 and capabilities needed to counter the projected threat beyond the 1980s without major changes in hardware and software. New hardware technology and new improvements in combat system capacity 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 AN/WLQ-4 SEA NYMPH Electronics Warfare System, now in production; the Attack Submarine Integrated Communication system, scheduled to begin advanced development in 1984; the AN/UYS-2 (XN-1)(V) Enhanced Modular Signal Processor, scheduled for advanced development in 1982; and standard Navy minicomputers such as the AN/UYK-43 and AN/UYK-44. Within the constraints of this equipment and the performance requirements specified by the Navy, the developing contractor will design the Combat Control/Acoustic subsystem, the data distribution network, displays, and software nesessary 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 development improvements. 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 their 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 [ ] and will be constrained to using the sensor arrays and weapon launch/handling systems planned for these ships. Follow-on developments will consist of the incremental upgrading of the initial system with those capabilities found by continuing threat analysis to be necessary. This effort will build on the initial 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.

(U) RELATED ACTIVITIES: S1347 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 this program. 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

Project: S1347 — Title: Submarine Advanced Combat System (Engineering)
Program Element: 64524N — Title: Submarine Advanced Combat Systems (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare — Budget Activity: 4 - Tactical Programs

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). Other related programs include the following:

Program Element	Program Element
24163N, project X0695, High Frequency Improvement	63590N, Wide Aperture Array (Advanced)
24281N (All Projects), Submarines	63708N, project S0823, Acoustic Performance Prediction
31325N, PRAIRIE WAGON	64502N, Submarine Integrated Antenna System
33109N, project X0731, Fleet Satellite Communications	64503N, Submarine Sonar Development (Engineering)
62633N, SP 33-341, Undersea Weapons Guidance and Control	64507N, Enhanced Modular Signal Processor
62721N, XF 21-221, Tactical Acoustic Communications	64514N (All Projects), Navigation Systems
63503N, Acoustic Communications (Advanced)	64515N, Submarine Surveillance Equipment Program
63504N (All Projects), Submarine Sonar Development (Advanced)	64524N, project X1411, described herein
63509N, project S0248, Shipboard Data System	64562N (All Projects), Submarine Tactical Warfare Systems (Engineering)
63530N, project X0798, Over-the-Horizon Targeting	64566N, Acoustic Communications (Engineering)
63562N, project S0210, Submarine Acoustic and Torpedo Countermeasures and S1686, Attack Submarine Combat Control Systems Improvement (Advanced)	

(U) WORK PERFORMED BY: In-House: The Naval Sea Systems Command, Washington, DC has the responsibility of overall program management and for development and procurement of those system elements associated with acoustic and combat control capabilities. 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; and Naval Research Laboratory, Washington, DC. Contractors. EG&G, Washington Analytic Services Center, Rockville, MD has been selected competitively to support planned submarine advanced combat system engineering and integration activities. The prime contractor for Submarine Advanced Combat System Combat Control/Acoustic subsystem will be selected by mid-FY 1982.

Project: S1347 Title: Submarine Advanced Combat System (Engineering)
Program Element: 64524N Title: Submarine Advanced Combat Systems (Engineering)
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: The Submarine Advanced Combat System (Engineering) program is an FY 1982 new start. The top-down analytical effort and engineering studies which form the basis of the program were initiated under other programs and defined under the Submarine Advanced Combat System (Advanced) program (Program Element 63524N).

2. (U) FY 1982 Program: Initiate unit design for Submarine Active Detection Sonar, develop solicitation documents, award a receive subsystem full scale development contract and continue full scale development of the transmit subsystem initiated under Program Element 63524N, project S1346, Submarine Advanced Combat Systems (Advanded). Develop computer program performance specifications and finalize reliability and maintainability plans and prediction reports. Complete Submarine Active Detection Sonars Receive Subsystem unit specifications.

3. (U) FY 1983 Planned Program: Complete critical item validation and initiate unit design for the Combat Control/Acoustic subsystem. Continue full scale development of the Submarine Active Detection Sonar and the Navigation Plotter/Combat Summary Display. Initiate full scale development of the Combat Control/Acoustic subsystem. All necessary experimental work will have been performed and the Combat Control/Acoustic Subsystem will be ready for full scale development. Increase in funding from FY 1982 to FY 1983 reflects the start of Combat Control/Acoustic Subsystem full scale engineering development.

4. (U) FY 1984 Planned Program: Complete Combat Control and Acoustic Subsystem unit design, initial design/code and software module test. Develop the computer program design specifications and conduct the critical design review. Initiate product improvement program and update life cycle cost documentation, and test and evaluation master plan. Finalize the test requirements specifications, initiate and complete unit design for displays and combat controls and finalize the unit design for acoustic and weapons controls. Initiate all software design and implementation programs and test and integration procedures for unit test beds/facilities and the software modular tests. Continue full scale development of supporting government furnished equipment.

5. (U) Program to Completion: The full scale development effort will provide an engineering development model, lead ship system, maintenance trainer, operator trainer and team trainer. Approval for service use is planned for FY 1993. The lead ship and maintenance trainer will be funded by Ship Construction, Navy funds.

6. (U) Milestones:

Submarine Advanced Combat System Initial Phase*		Date
a. Critical Item Tests	(June 1981 - August 1982)**	April 1982 - July 1983
b. Defense Systems Acquisition Review Council - Milestone I/II (Decision Coordinating Paper revised)	(May 1982)**	February 1983

Project: S1347
Program Element: 64524N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Advanced Combat System (Engineering)
Title: Submarine Advanced Combat Systems (Engineering)
Budget Activity: 4 - Tactical Programs

		Date
c.	Phase - I Transition to Full-Scale Engineering Development Award Full-Scale Development Contract	(May 1982)** March 1983

* Milestone preceding those shown are contained in the Descriptive Summary for Program Element 63524N, project S1346.
**Milestones from FY 1982 Desciptive Summary. Changes in milestones due to program restructuring.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
S1347	Submarine Advanced Combat System* (Quantities)	0	29,674* (2)**	84,207	131,882	1,099,488	1,345,251

* Additional FY 1982 and prior year funding is contained in Program Element 63524N, project S1346 (Submarine Advanced Combat System (Advanced)).
** The Descriptive Summary for Program Element 63504N, project S0223-AS identifies test items for the Submarine Active Detection Sonar development transitioning to this Program Element in FY 1982. Other critical items will be identified during the FY 1982 concept development competition. A single contractor will integrate all elements.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64526N
Title: Amphibious Assault Ship (General Purpose)
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Program

(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	-	15,000	-	-	-	15,000
S1681	Amphibious Assault Ship	-	15,000	-	-	-	15,000

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The primary objective of the Amphibious Assault Ship (General Purpose) LHD-1 Class Program is to design, construct, test and deliver ships to the Navy to increase amphibious lift capability and to replace the aging LPH-2 class from 1990 through 2000. Current program emphasis is focused on the prusuit of baseline design, reactivation of the land based test facility, and engineerng design.

(U) BASIC FOR FY 1983 RDT&E REQUEST: Not applicable.

(U) COMPARISION WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). Not applicable. The Congress added $15,000 in FY 1982 to commence design of the LHDX.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not applicable.

Program Element: 64526N
DoD Mission Area: 238 - Other Naval Warfare

Title: Amphibious Assault Ship (General Purpose)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Amphibious Assault Ship (General Purpose), LHD-1 Class, Program was established to design, contruct, test and deliver ships to the Navy during the time period 1990 to 2000 to increase amphibious lift capacity and to replace the aging LPH-2 Class Amphibious Assault Ships scheduled to be retired in the 1990's. The LHD-1 is designed primarily for amphibious assault warfare. The secondary (convertible) mission will be sea control/strike/contingency operations, wherein the ship will have the capability of deploying fixed-wing (V/STOL) aircraft and helicopters. The LHD-1 will transport elements of the landing force (personnel, vehicles, cargo and POL), landing craft (air cushioned and conventional), fixed-wing (V/STOL) aircraft and helicopters to an Amphibious Objective Area, and launch pre-loaded assault craft (amphibious vehicles and landing craft), fixed-wing (V/STOL) aircraft and helicopters in support of an aphibious assault operation. This conventionally powered LHD-1 will be capable of operating in concert with other forces in an amphibious warfare environment, functioning as an element of an Amphibious Task Group or Force, in projection of power ashore. In the convertible role, the ship will employ various mixes of V/STOL aircraft and helicopters as dictated by the mission assigned. Funding has been directed toward the pursuit of a modified LHA design with a convertible mission role. The characteristics of the LHD-1 Class ships include: length; 820 feet; beam, 106 feet; displacement, 40,000 tons, and steam propulsion plant.

(U) RELATED ACTIVITIES: Ship Development (Advanced), PE 63564N; Amphibious Assault Craft, PE 63566N; Ship Subsystem Development, PE 64567N; Amphibious Assault Ships, PE 24411N.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Personnel and Training Analysis Office, Washington, D.C.; Naval Sea Data Support Activity, Port Hueneme, CA; Naval Ship Weapon System Engineering Station, Port Hueneme, CA; Naval Sea Systems Command, Washington, DC; Naval Air Engineering Support Unit, Philadelphia, PA; Supervisor of Shipbuilding, Pascagoula, MI; Naval Electronics Systems Command, Washington, D.C.

Contractors: Ingalls Shipbuilding Division, Pascagoula, MI; TRW Corporation, McLean, VA; Designers and Planners, Washington, DC.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: In June 1980, the Senate Armed Services Committee requested that the Department of Defense initiate design of a new class of amphibious, air-capable ships that would incorporate the capabilities of the LHA, but would also be capable of employment as a V/STOL Support Ship. In April 1981, in its report on the FY 1982 Appropriations Act, the SASC referred to its previous year recommendation, and viewed the LHDX as a replacement ship for LPH and LPDs. In May 1981, feasibility studies were initiated based on these parameters. The Secretary of the Navy, in a letter to the SASC Chairman in June 1981 stated that the LHDX would be a new Class of major amphibious assault ships embodying many of the advance concepts developed, such as the ski jump and V/STOL technology, with overall lift capacity and size similar to the LHA-1 Class, but with the capability to carry 3 LCACs. Further detail on the LHDX multi-mission role was provided in the SECNAV letter, as well as a

Program Element: 64526N
DoD Mission Area: 238 - Other Naval Warfare

Title: Amphibious Assault Ship (General Purpose)
Budget Activity: 4 - Tactical Programs

recommendation to accelerate the program. In June 1981, the initial draft of the Top Level Requirements for LHDX was prepared. The first draft Test and Evaluation Master Plan on LHDX was issued in July 1981.

2. (U) FY 1982 Program: In October 1981, the Secretary of the Navy, the Assistant Secretary of the Navy (Shipbuilding and Logistics), and the Chief of Naval Operatons were briefed on the LHDX program. Guidance was provided to pursue the modified LHA design with a convertible mission role. In December 1981, CNO designated the LHDX as the LHD-1 class. The Navy Decision Coordinating Paper is presently being drafted, and will support and promulgate the Chief of Naval Operations decision for this program. The program will follow Acquisition Category IIS procedures, and is not subject to concurrency of development and production. A contract has been awarded to Ingalls Shipbuilding Division, Litton Systems, Inc. to develop the LHD-1 baseline design using the LHA design as modified by Top Level Requirements. As a result of significant program acceleraton to an early FY 1984 lead ship, it is proposed to negotiate and award a contract to Ingalls Shipbuilding Division on a non-competitive basis. This award is to be made in July 1982 based on a Naval Sea Systems Command Determination and Findings re ued by the Assistant Secretary of the Navy (Shipbuilding and Logistics), stating that the LHD-1 design will be based on the Lha class ship which was designed and built by Ingalls. This sole source contract will be to conduct engineering design and to procure long lead materials, with an option to construct the lead LHD-1 class ship. Engineering design will commence in the summer of 1982.

3. (U) FY 1983 Planned Program: Program transferred to PE 64567N, Ship Subsystems Development and Ship Design (SCN) in FY 1983.

4. (U) FY 1984 Planned Program: Program transferred to PE 64567N, Ship Subsystems Development and Ship Design (SCN) in FY 1983.

5. (U) Program to Completion: Program transferred to PE 64567N, Ship Subsystems and Ship Design (SCN) in FY 1983.

6. (U) Milestones:

Feasibility Studies	May 1981 - December 1981
Baseline Design	December 1981 - July 1982
Engineering Design	July 1982
Lead Ship Contract Award	December 1983

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64554N
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	11,398	8,540	6,673	11,245	Continuing	Continuing
X0669	Jamming and Deception	668	1,805	1,086	0	0	20,653
X0672	Effectiveness of Navy Electronic Warfare Systems	9,742	6,735	5,587	11,245	Continuing	Continuing
X0844	Ultra-High Frequency Direction Finder	588	0	0	0	0	1,390
X1659	OMEGA Replacement	400	0	0	0	0	400

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will improve the electronic warfare posture of the Fleet by engineering development and test of passive and active electronic warfare systems and equipments. The functions and operation of electronic warfare and surveillance include: detection of emissions including classification/identification (identify source and provide threat warning), and countermeasures to provide false location or identification to enemy sensors through jamming/deception (deceive homing weapons by inducing errors in their guidance systems or provide false targets by decoys), and surveillance by providing early target acquisition data to own weapon system.

(U) BASIS FOR FY 1983 RDT&E REQUEST: X0669: Jamming and Deception:

Decrease $719 thousand between FY 1982 and FY 1983 was in anticipation of program completion in FY 1983. X0672: Effectiveness of Navy Electronic Warfare Systems: Continue program to convert a P-3B aircraft

Decrease (1,143) between FY 1982 and FY 1983 is due to mandated overall military budget reductions. As this is a coninuing program, the above funding profile includes outyear escalation and encompassess all work on 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: X0672 Effectiveness of Navy Electronic Warfare Systems. Decreases (100 in FY 1981 and 7 in FY 1982) are due to routine budget adjustments. FY 1983 and FY 1984 estimates of 6,673 and 11,245 respectively, reflect definitization of estimates which were displayed as TBD "To Be Determined" on last year's Descriptive Summary.

Program Element: 64554N
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	11,455	10,698	8,547	TBD	TBD	TBD
X0669	Jamming and Deception	1,380	668	1,805	TBD	TBD	TBD
X0671	Tactical Electronic Warfare Deception Systems	2,787	0	0	TBD	TBD	TBD
X0672	Effectiveness of Navy Electronic Warfare Systems	6,677	9,842	6,742	TBD	TBD	TBD
X0674	Emission Monitor and Control	529	0	0	TBD	TBD	TBD
Y0844	Ultra-High Frequency Direction Finder	82	188	0	TBD	TBD	TBD

(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
X0669	Jamming and Deception						
	AN/WLR-8(V)4						
	Other Procurement, Navy	6,374	5,816	4,783	12,795	23,939	53,707
	(Quantity)	(3)	(3)	(2)	(1)	(6)	(15)
	Operations and Maintenance, Navy	570	713	800	909	Continuing	Continuing
	Ship Construction, Navy	0	3,928	10,988	0	0	14,916
	(Quantity)	(0)	(2)	(5)	(0)	(0)	(7)
	Fleet Modernization Program		0	0	2,250	9,000	11,250
	(Quantity)		(0)	(0)	(3)	(12)	(15)
	AN/SLQ-17						
	Other Procurement, Navy	17,139	20,274	22,657	19,829	40,643	171,069
	(Quantity)	(2)	(2)	(2)	(2)	(1)	(15)
	Operations and Maintenance, Navy	1,230	1,780	1,780	1,810	Continuing	Continuing
	Ship Construction, Navy	0	0	10,279	0	0	23,479

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Program Element: 64554N
DoD Mission Area: 371 - Self Protection

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

Project No.	Title	Total FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Estimated Cost
	(Quantity)	(0)	(0)	(1)	(0)	(0)	(1)
	Fleet Modernization Program	0	2,933	6,768	8,071	8,588	27,860
X0671	Tactical Electronic Warfare Deception Systems						
	Other Procurement, Navy (SEE NOTE)	..,712	11,631	11,933	15,556	Continuing	Continuing
	Operations and Maintenance, Navy	640	600	670	652	Continuing	Continuing
	Ship Construction, Navy	1,460	0	0	0	Continuing	Continuing
	Fleet Modernization Program	9,500	13,160	7,755	6,000	Continuing	Continuing
X0674	AN/SSQ-82(V)						
	Other Procurement, Navy	0	0	0	0	0	5,200
	(Quantity)						(16)
	Operations and Maintenance, Navy	100	100	100	100	Continuing	Continuing
	Fleet Modernization Program	700	700	700	700	8,200	11,400

NOTE: Project X0671 Tactical Electronic Warfare Deception Systems is a continuing line, OPN, SCN, FMP, and O&M,N cover a family of decoys, e.g., Rapid Bloom Offboard Chaff, Super Rapid Bloom Offboard Chaff, etc.

Program Element: 64554N
DoD Mission Area: 371 - Self Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: Note - this paragraph begins with a general description of each Project, and then discusses Projects in more detail. The objective of this program is to improve the offensive and defensive electronic warfare posture of the Fleet by development of passive and active Electronic Warfare equipments for shipboard use. X0669 Jamming and Deception has developed the AN/SLQ-17A(V)2 Electronic Countermeasures and AN/WLR-8(V)4 passive surveillance systems. X0671 Tactical Electronic Warfare Deception Systems developed a family of decoys for protection of surface ships. X0672 Effectiveness of Navy Electronic Warfare Systems provides the capability

X0674 Emission Monitor and Control monitors and controls emissions aboard ship. X0844 Ultra High Frequency Direction Finder is developing an Ultra High Frequency Direction Finder set (AN/URD-10) to replace the obsolete set (AN/URD-4) presently in the Fleet. The AN/URD-10 will be installed. Details of each project are as follows:

X0669: Jamming and Deception:

X0671: Tactical Electronic Warfare Deception Systems: This program, PE 64573N Shipboard Electronic Warfare Improvements, provides a family of decoys to defend naval ships.

X0672: Effectiveness of Navy Electronic Warfare Systems: This program will investigate missile systems and evaluate the effectiveness of shipboard Electronic Warfare systems. This is a three-fold evaluation effort:

X0674: Emission Monitor and Control: The system is modular to allow simple adaptation to various classes of ships and employs standardized emitter interface modules for maximum commonality.

(U) RELATED ACTIVITIES: Army and Air Force efforts are continuously monitored for techniques and technology developments which are applicable to shipboard/airborne electronic warfare systems. Program Element 63521N, (Surface Electronic Warfare) and Program Element 64607N (Surface Electro-Optical Systems Advanced) are ongoing related developments. Simulation resources and investigative support services are provided to air, surface, and subsurface Electronic Warfare programs through all phases of Research, Development, Test and Evaluation. Support is provided to Program Element 64607N (Surface Electro-Optical Systems Advanced), Program Element PE 64573 (Shipboard Electronic Warfare Improvements). Specialized support is provided to the Fleet and the Navy Training Community. Simulators and instrumentation systems for the Fleet Electronic Warfare Support Group are provided under the technical direction of this program.

Program Element: 64554N
DoD Mission Area: 371 - Self Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Program

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Command, Washington, DC; Naval Sea Systems Command, Washington, DC; Naval electronic Systems Engineering Center, Portsmouth, VA; Naval Research Laboratory, Washington, DC; Naval Surface Weapons Center, Dahlgren, VA; Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, IN; Contractors: Hughes Aircraft Company, Fullerton, CA; ARGO Systems INC., Sunnyvale, CA; Raytheon Corporation, Bedford, MA; GTE Sylvania, Mountain View, CA; Control Data Corporation, Arlington, VA; SWL, Inc., Mclean, VA; LaBarge Electronics Division, Tulsa, OK; E-Systems, Falls Church, VA; Sanders Associates, Inc., Nashua, N.H.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: X0669: Jamming and Deception: Development, construction, installation and evaluation of the stand-alone AN/SLQ-17A(V)2 completed and provisional Approval for Service Use obtained. Production of AN/SLQ-17A(V)2 initiated. Development and testing of the
completed. AN/WLR-8(V)4 hardware/software improvements completed. An/WLR-8(V)4 in process. Provisional Approval for Service Use for initial procurement of the AN/WLR-8(V)4 has been received. X0671: Tactical Electronic Warfare Deception Systems: Preliminary Active Electronic Decoy payload, flight vehicle concept evaluated. Three Active Expendable Decoy contract definition studies were awarded and completed. The MK-33 Rapid Bloom Offboard Chaff system successfully completed Operational Evaluation and was Service Approved. Development versions of the MK-34 Rapid Bloom Offboard Chaff system, mounted aboard fast Hydrofoil ships, demonstrated high effectiveness against
Completed Technical and Operational Evaluation of the MK 36 Super rapid Bloom Offboard Chaff Launcher and MK 182 Chaff Cartridge on a guided Missile Cruiser. Super Rapid Bloom Offboard Chaff has been approved for service use and is currently in production. X0672: Effectiveness of Navy Electronic Warfare Systems: This program established in FY 1970 to provide a capability for the navy to investigate and evaluate the effectiveness of shipboard electronic warfare systems. This capability for effectiveness evaluation has been accomplished through the development of:

X0674: Emission Monitor and Control: In FY 1974 a limited radiation management device, capable of monitoring emisions, was developed in exploratory development and demonstrated at sea in FY 1975. A feasibility demonstration model of a system featuring

Program Element: 64554N
DoD Mission Area: 371 - Self Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Program

emissions control as well as monitoring (Multiplexed Unit for Transmission Elimination AN/SSQ-82(V)) was developed and successfully tested at sea. Production of AN/SSQ-82(V) initiated. X0844: Ultra High Frequency Direction Finding: The Ultra High Frequency direction Finding Set (AN/URD-10) is undergoing contractor and NAVELEX testing in preparation for Developmental and Operational Testing.

2. (U) FY 1982 Program: X0669: Jamming and Deception: Continue production of AN/SLQ-17A(V)2. Begin production of the AN/WLR-8(V)4. Continue development of replacement

Complete hardware/software improvement modifications to AN/WLR-8(V)4.

X0672: Effectiveness of Eleccronic Warfare Systems: Continue conversion of P-3B aircraft for use

Continue development of antiradiation missiles seeker simulators to test and evaluate

programs. Begin integration of

3. (U) FY 1983 Planned Program: X0669: Jamming and Deception: Complete development and initiate test and evaluation of AN/WLR-8(V)4. Continue production of AN/WLR-8(V)4. Continue AN/SLQ-17A(V)2 production. Continue WLR-8/SLQ-17 integration effort. Decrease (719) between FY 1982 and FY 1983 was in anticipation of program completion in FY 1983. X0672: Effectiveness of Navy Electronic Warfare, Systems:

Initiate design and integration

Initiate definition and design of variants to the generic simulator. Decrease (1,148) between FY 1982 and FY 1983 is due to mandated overall military budget reductions.

4. (U) FY 1984 Planned Program: X0669: Jamming and Deception: Complete development testing on

Contnue WLR-8/SLQ-17 interface and initiate testing. Continue AN/SLQ-17A(V)2 production. X0672: Effectiveness of Navy Electronic Warfare Systems:

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

Program Element: 64554N
DoD Mission Area: 371 - Self Protection

Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Program

6. (U) Milestones: Not applicable.

Project. X0672
Program Element: 64554N
DoD Mission Area: 371 - Self Protection

Title: Effectiveness of Navy EW Systems (ENEWS)
Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Effectiveness of Navy Electronic Warfare Systems Program develops and maintains resources for evaluating Navy electronic warfare equipment in all phases of development and fleet deployment. The methodology used in the evaluation process exists in three general forms: [redacted] and (3) computer simulation using large-scale computer modeling of task force scenarios. The needs and objectives of the Effectiveness of Navy Electronic Warfare Systems program [redacted] Effectiveness of Naval Electronic Warfare objectives thus include: [redacted] and development of simulation [redacted] sets to support Area Electronic Warfare and coordinated defense concepts.

(U) RELATED ACTIVITIES: Simulaton resources and support services are provided to surface, air, and subsurface electronic warfare programs through all phases of Research, Development, Test and Evaluation. Specialized support is provided to the Fleet and Navy Training Community. Simulators and instrumentation systems for the Fleet Electronic Warfare Support Group are provided under the technical direction of this program.

(U) WORK PERFORMED BY: Naval Electronic Systems Command, Washington, DC; Naval Research Laboratory, Washington, DC; Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, IN; Naval Electronics Systems Engineering Center, Portsmouth, VA; SWL Inc., McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program was established in FY 1970 to provide a capability for the Navy to [redacted] These models are also used for tactics development and operations analysis. Development completed on [redacted] simulators for initial use in [redacted] development testing. Continued simulator maintenance program to support Electronic Warfare Systems testing and evaluation. The EC-121

Project: X0672 — Title: Effectiveness of Navy EW Systems (ENEWS)
Program Element: 64554N — Title: Surface Electronic Warfare
DoD Mission Area: 371 - Self Protection — Budget Activity: 4 - Tactical Programs

aircraft used as the platform for aircraft Electronic Warfare simulation was retired from service. This vital airborne Electronic Warfare capability is now realized by conversion of an EP-3B aircraft as the dedicated Electronic Warfare simulation laboratory. EP-3B conversion efforts began to fully integrate Electronic Warfare simulation capability into aircraft. Hardware design initiated for Effectiveness of Navy Electronic Warfare Systems and Fleet Electronic Warfare Support Group use.

Additional

2. (U) FY 1982 Program: The EP-3B aircraft conversion program will be continued and will include installation of The hardware integration phase will begin. Effectiveness of Navy Electronic Warfare System simulation assets will be expanded to include Area Electronic Warfare and coordinated defense concepts. All phases of The simulator maintenance program will be continued.

3. (U) FY 1983 Planned Program: The Fleet Electronic Warfare Support Group will continue hardware development and begin acceptance testing. Continue simulations for The EP-3B conversion program will include The simulator maintenance program will be continued.

Infitation of definition and design of variants to the initial will begin. The decrease of 1,148 thousand from 1982 funding is due to mandated military budget reductions.

4. (U) FY 1984 Planned Program: The Fleet Electronic Warfare Support will be completed. Hardware development of variants to the will be initiated to cover a broader spectrum Variants will be developed The simulator maintenance program will be continued.

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

Project: X0672
Program Element: 64554N
DoD Mission Area: 371 - Self Protection

Title: Effectiveness of Navy EW Systems (ENEWS)
Title: Surface Electronic Warfare
Budget Activity: 4 - Tactical Programs

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
X0672	Effectiveness of Navy Electronic Warfare Systems	9,742	6,735	5,587	11,245	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64561N
Title: Submarine (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Program

(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	1,699	2,041	1,950	2,229	Continuing	Continuing
S0411	Submarine Drag Reduction Program	1,699	2,041	1,950	2,229	Continuing	Continuing
	(Quantity - Main Ballast Tank Floodhole Covers (Set))*						(2)
	(Quantity - Low Drag Sail)*						(1)

* Development Test and Evaluation

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element encompasses engineering efforts directed toward enhancing submarine tactical capability, by increasing the top speed capability of existing and future submarines without increasing shaft horsepower, by reducing hull and appendage drag characteristics and increasing propulsive efficiency. Submarine hull and appendage design features and subsystems will be developed and evaluated to demonstrate drag reduction concepts. Higher speeds may be required in light of the ever increasing numbers of high speed submarines entering service in the Soviet fleet.

(U) BASIS FOR FY 1983 RDT&E REQUEST: A prototype main ballast tank floodhole cover system will be designed and fabricated for later installation in a submarine for test and evaluation. Model testing to confirm criteria for hull and propeller design will be conducted. Shipboard evaluation of low drag hull coatings will continue. Complete evaluation of methods to remove fouling from ship hulls and propellers. 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 1994 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 include -14 in FY 1981 for inflation reduction, and -28 in FY 1982 and -264 in FY 1983 due to budget 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	2,455	1,713	2,069	2,214	Continuing	Continuing

Program Element: 64561N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine (Engineering)
Budget Activity: 4 - Tactical Program

Project No.	Title	Total FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Estimated Cost
S0411	Submarine Drag Reduction Program	2,455	1,713	2,069	2,214	Continuing	Continuing
	(Quantity - Main Ballast Floodhold Covers (set))*						(2)
	(Quantity - Low-Drag Sail)*						(1)

* Development Test and Evaluation

(U) OTHER APPROPRIATION FUNDS: None

Program Element: 64561N
Title: Submarines (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: In recent years the USSR has introduced in ever increasing numbers high-speed submarines of all types, i.e., attack, cruise-missile and strategic ballistic-missile submarines. In order to overcome this deficiency, two paths are available: One is to build higher-powered submarine propulsion plants. The other, which is the objective of the Submarine Drag Reduction Program, is to develop, evaluate and demonstrate low drag hulls and appendages and highly efficient propulsors which will lead to an increase in the top speed capability of existing and future submarines without increasing shaft horsepower. Additionally, these features will permit a submarine to attain a given speed with less power than possible today. In this program the drag and/or loss of speed associated with hull openings, sail, control surfaces, propulsor and hull form, and roughness, fouling and protuberances will be evaluated systematically by means of model tests and analytical studies. Recommended improvements will be evaluated by full scale trials.

(U) RELATED ACTIVITIES: Program Element 63561N - Submarines (Advanced), Project S0207 Advanced Submarine Control Program - The objective of this program is to develop advanced and integrated control systems to increase the operational safety and design efficiency of submarines. Commonality with the Submarine Drag Reduction Program is in the area of control surface design (rudder, stern planes and stabilizers, etc.). These surfaces are a major contributor to submarine drag. Development efforts pertaining to the drag and control aspects of control surfaces are coordinated between the two programs. The Submarine Silencing Program, (Program Element 25634N, project S0218) and the Submarine Propellers program (Program Element 63561N, project S1266) are conducting efforts to improve the performance of submarine propellers.

(U) WORK PERFORMED BY: In-House: David W. Taylor Naval Ship Research and Development Center, Bethesda, MD., (Lead Laboratory); Naval Sea Systems Command, Washington, D.C.; Norfolk Naval Shipyard, Portsmouth, VA; Pearl Harbor Naval Shipyard, Pearl Harbor, HI. Contractors: General Dynamics/Electric Boat Division, Groton, CT.; Operations Research, Inc., Silver Spring, MD., , Miami Marine Research, Inc., Miami Beach, FL.; Applied Research Laboratory, Pennsylvania State University, University Park, PA.; Daedalean Associates, Inc., Woodbine, MD., Hydrodynamics Research Associates, Inc., Westfield, NJ; Scientex, Washington, DC; NKF Engineering Associates, Vienna, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Fabricated main ballast tank floodhole covers for use in shipboard testing to determine drag reduction. Installed covers in USS LAPON and conducted tests to prove operability. Conducted efforts to quantify the drag caused by hull roughness and fouling. Conducted laboratory, field and shipboard evaluation of low drag hull coatings. Conducted model tests of high efficiency hull/propeller combinations to reduce drag and improve propulsive efficiency. Completed laboratory evaluation of low drag stern appendages. Conducted evaluation of low drag sail shapes. Initiated development of design methods for advanced propulsor. Completed laboratory evaluation of using retractable bow planes in lieu of sail planes.

Program Element: 64561N Title: Submarines (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Program

2. (U) FY 1982 Program: Install temporary main ballast tank floodhole covers on an attack submarine and conduct sea trial to determine speed improvement. Continue study of high performance hull/propeller combinations and develop criteria for hull/propeller design. Continue shipboard evaluation of low drag hull coatings. Continue model testing to determine full scale design criteria for low drag sails. Evaluate methods to remove fouling from ship hulls and propellers. Develop methods for more accurate prediction of full scale drag using the results of model tests. Evaluate waxing technique to pevent fouling of propellers during ship dockside periods.

3. (U) FY 1983 Planned Program: Begin design and start fabrication of prototype main ballast tank floodhole cover system. Continue at-sea evaluation of selected low drag hull coatings. Complete evaluation of methods to remove fouling from ship hulls and propellers. Design and begin fabrication of a low drag sail for shipboard evaluation. Continue improvement of hull/propeller design criteria for use by ship designers.

4. (U) FY 1984 Planned Program: Complete design and fabrication of prototype main ballast tank floodhole cover system. Conduct full scale test of low drag sail. Continue at-sea evaluation of selected low drag hull coatings. Develop improved hull/propulsor design criteria.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Submarine Tactical Warfare Systems (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	33,768	95,242	32,598	34,720	Continuing	Continuing
S0235	Submarine Acoustic Warfare Systems	2,136	1,978	2,038	3,593	Continuing	Continuing
	(Sub-Tasks; Quantities)						(1/)
S0236	Attack Submarine Combat Control System Improvement Progras (Engineering)	24,832	30,772	30,560	31,127	Continuing	Continuing
	(Sub-Tasks; Quantities)						(1/)
S0366	MK 48 Advanced Capabilities (Engineering)	6,800	62,492	(166,271)2/	(111,483)2/	(31,414)2/	(378,460)2/
	(Quantity-Engineering Development Torpedo Modifications)		(40)3/				(40)3/
	(Quantity-Engineering Development Model Automated Test Equipment		(3)3/				(3)3/

1/ Sub-tasks and test item quantities are too numerous to tabulate.
2/ Project S0366 transfers to Program Element 64675N (MK 48 Advanced Capabilities) in FY 1983. Estimates shown in parentheses are provided for convenience, and do not contribute to the FY 1983 and later totals for this Program Element. The total cost estimate applies to the engineering development phase (Program Elements 64562N and 64675N) only.
3/ Development/Operational Test and Evaluation.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element accomplishes design, engineering development, test and evaluation of submarine tactical warfare systems and weapons. Included in these efforts to counter the current and projected threat are improved acoustic and weapons countermeasures (including acoustic warfare systems), launching systems, target motion analysis and weapon control (fire control) systems combat system engineering and functional analysis (end-to-end modeling), tactical situation displays, incorporation of communication/data links for attack submarine command and control, and (prior to FY 1983) submarine launched torpedoes.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0235, Submarine Acoustic Warfare Systems: Continue engineering development and test and evaluation of external countermeasures launcher and improved acoustic and torpedo countermeasures. Commence engineering development of acoustic warfare display improvement. Project S0236, Attack Submarine Combat Control Systems Improvement Program (Engineering): Full-scale development of hardware and software modifications to the MK-117 Fire Control System to provide

Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

TOMAHAWK weapon orde generation and an associated over-the-horizon targeting capability will complete the conversion of this system to Combat Control System MK 1. Project S0366, MK 48 Advanced Capabilities (Engineering): See the Descriptive Summary for Program Element 64675N. 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 (amended) FY 1982 Descriptive Summary and this Descriptive Summary are as follows: RDT&E,N - (1) Project S0366 has been structured to transfer from this program element to Program Element 64675N in FY 1983 and its name has been changed from Torpedo Engineering Development to MK 48 Advanced Capabilities (Engineering). (2) The FY 1981 total funding has decreased by 14,870 as the net result of transfer of 15,235 from project S0366 of this program element to project S0311 of Program Element 63562N (to continue accelerated/concurrent MK 48 Advanced Capabilities advanced development) inflation adjustments (-703), and addition of 1,068 to project S0236 for support of submarine-launched TOMAHAWK Over-the-Horizon Targeting development. (3) The FY 1982 estimate has decreased by 11,815 due primarily to restructuring of project S0366 (-11,565) and additionally to minor revisions in projects S0235 and S0236 (-50 and -200, respectively). (4) FY 1983 estimates for projects S0235 and S0236 have been provided as shown. (5) Restructuring of project S0366 (MK 48 Advanced Capabilities (Engineering)) has resulted in a one year delay in award of the full-scale engineering development contract (engineering development model procurements) and reduction of the numbers of engineering development model equipments to be procured (-8 torpedo modifications and -4 sets of automated test equipment). (6) Projects S0320 (Submarine Weapons Stowage and Launch) and X0959 (OUTLAW SHARK) completed in FY 1980 and are therefore not shown. Other Procurement, Navy - (1) Submarine Acoustic Warfare Systems FY 1981 and FY 1982 estimates have changed by -211 and +12, respectively due to minor adjustments. The FY 1983 estimate has decreased by 5,070 due to restructuring of the external countermeasures launcher program. (2) The FY 1981 estimate for Mobile Submarine Simulator procurement has decreased by 3,524 due to revision of the procurement contract. (3) MK 117 Fire Control System estimates have changed by +2,440, 1,789 and +23,803 in FY 1981, 1982 and 1983, respectively due to incorporation of the MK 48 Advanced Capabilities Platform Modifications and MK 117 Fire Control System Improvements estimates shown in the FY 1982 Descriptive Summary and to revision of estimates. The total estimated cost of this program is shown as "continuing" in view of the above changes. Weapons Procurement, Navy funding for MK 48 Advanced Capabilities torpedo alterations has been deferred to FY 1984 to be consistent with the restructuring of project S0366 of this Program Element, and is accordingly shown in the Desciptive Summary for Program Element 64675N.

(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	29,695	48,638	107,057	TBD	TBD	TBD
S0235	Submarine Acoustic Warfare Systems	2,290	2,136	2,028	TBD	TBD	TBD
	(Sub-Tasks; Quantities)						(***)

Program Element: 64562N — Title: Submarine Tactical Warfare Systems (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare — 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
S0236	Attack Submarine Combat Control System Improvement Program	19,918	23,764	30,972	TBD	TBD	TBD
	(Sub-Tasks; Quantities)						(***)
S0320	Submarine Weapon Storage/Launch	2,201	0	0	TBD	TBD	TBD
S0366	Torpedo Engineering Development	*	22,738*	74,057*	TBD	TBD	TBD
	(Quantity - Engineering Development Torpedo Modifications)		(**)				TBD
	(Quantity - Engineering Development Model Automated Test Equipment		(**)				TBD
X0959	OUTLAW SHARK	5,286	0	0	TBD	TBD	TBD
	(Quantities)						(***)

* See descriptive summary for Program Element 63562N (Submarine Tactical Warfare Systems (Advanced))
** Development/Operational Test and Evaluation
*** Sub-Tasks and Test Item Quantities are too numerous to tabulate.

(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						
Submarine Acoustic Warfare Systems	5,999	6,995	7,530	16,423	Continuing	Continuing
Mobile Submarine Simulator	9,942	*	*	*	*	*
(Quantity)	(4a)	(*)	(*)	(*)	(*)	(*)
MK 117 Fire Control System - Basic **	36,746	57,778	51,986	39,308	(Continuing)	(Continuing)
(Quantity)	(7)	(10)	(5)	(4)	(Continuing)	(Continuing)
Weapons Procurement Navy						
MK 48 Advanced Capabilities Torpedoes	0	0	***	***	***	***

* See the Descriptive Summary for Program Element 11221N (Fleet Ballistic Missile System), Project S1265 (Ballistic Missile Submarine Unique Countermeasures).

Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

** This Other Procurement, Navy funding is for procurement of complete MK 117 Fire Control Systems until FY 1983 In FY 1983 it is combined with Attack Submarine Combat Control Systems Improvement program which provides for various improvements such as increased Display and Conversion for Over-the-Horizon Targeting, TOMAHAWK Fire Control Modifications, Emergency Weapon Firing Capability, Torpedo Room Maintainability Upgrade, Attack Center Interface Unit and Weapons Launch Console, HARPOON and MK 48 Fire Control Upgrades, and Miscellaneous and/or ancillary equipment modifications planned for continuing procurement to upgrade and modernize the base MK 117 Fire Control System. This procurement will support 99 systems.

*** See the Descriptive Summary for Program Element 64675N for FY 1983 and later funding.

Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: S0235 Submarine Acoustic Warfare Systems: This project provides submarines with an increased capability to survive an encounter, thereby increasing the probability of carrying out their primary mission. Submarine Acoustic Warfare Systems assist in the detection and classification of underwater weapons and active acoustic sensors, permitting quick reaction to weapon attack and providing countermeasure devices for jamming, decoying and/or breaking contact. Submarine Acoustic Warfare Systems consist of several independent subsystems: The AN/WLR-9A or 12 which uses an Acoustic Intercept Receiver and a set of dedicated multimode hydrophones to detect and classify active acoustic emissions from weapons and acoustic sensors; the AN/BLR-14 which contains a receiver/processor, command/display, three-inch semi-automatic countermeasures launcher, and interface arrangements[ ]. The semi-automatic launcher allows rapid launch of an acoustic countermeasure when required. Current Submarine Acoustic Warfare System countermeasures include the following expendable devices: Acoustic Device Countermeasure MK 2 Mod 0, to [ ] Countermeasure Set, Acoustic MK 1 Mod 0 an externally launched countermeasure[ ] Mobile Submarine Simulator, a [ ] Noisemaker Acoustic Expendable, a[ ] electro-mechanical noisemaker to[ ] and submarine Expendable Bathythermograph to measure temperature versus depth for sonar predictions and weapon settings. The submarine Acoustic Warfare Systems development program is developing advanced counter-measure devices, external countermeasure launching systems for submarines, and improvements to the existing Submarine Acoustic Warfare Systems suite. S0236 Attack Submarine Combat Control Systems Improvement Program (Engineering): Continued development of an integrated attack submarine Command/Fire Control System, utilizing current and evolving digital technology which is required to improve combat system effectiveness in order to maintain the qualitative superiority of U.S. attack submarines and their combat systems. This is achieved by improving target motion analysis and tactical displays, better management of available information, incorporation of new data sources, and otherwise optimizing system capabilities in a tactical environment. The focal point of the system is the MK 117 Fire Control and Command System. The attack submarine command/fire control system improvements developed will be adaptable to both current and new construction attack submarines largely through software changes. The program has supported development of the digital weapon control equipments (MK 82 Weapon Data Converter and MK 92 Attack Control Console) and computer programs utilized in the MK 117 Fire Control System. The MK 117 fire control system is being installed in SSN 688 Class submarines (commencing with USS DALLAS (SSN 700) and SSN 594/SSN 637 Class submarines incident to the AN/BQQ-5 sonar backfit. The follow-on efforts of the program will be to develop and integrate improvements to attack submarine command, fire control, and data processing systems for installation in follow-on SSN 688 Class submarines and for backfitting into existing attack submarines where appropriate. These continuing developments will ensure the attack submarine Combat Control System effectively uses all sensor data and will handle all attack submarine weapons including TOMAHAWK, Common ASW Standoff Weapon, Submarine Launched Mobile Mine and others. S0366 MK 48 Advanced Capabilities: Predicted advances in Soviet submarine design and capability will reduce the program effectiveness of the fleet MK 48 torpedo[ ]. The use of[ ]. The increased depth and speed capabilities associated with the threat further compound the problem. The use of countermeasures is much more effective with the reduced target strength. It is feasible to regain the lost performance with the Advanced Capability, MK 48 Torpedo by use of digital processing[ ]possible now with improved components and technology and improvements in the propulsion and fuel tank subsystem.

Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: Advanced development of acoustic warfare concepts transitioning to Project S0235, Submarine Acoustic Warfare Systems is conducted under Program Element 63562N, project S021C, Submarine Acoustic and Torpedo Countermeasures. Beginning in FY 1981, the Mobile Submarine Simulator development was funded under Program Element 11221N, project S1265 (Ballistic Missile Submarine Unique Countermeasures) vice project S0235. The Attack Submarine Combat Control System Improvement (Engineering) Program (project S0236) modifies MK 117 Fire Control System hardware and software to accommodate new and improved submarine launched weapons and launch capabilities including: TOMAHAWK Cruise Missile (Program Element 64367N, project X0545), MK 48 Advanced Capabilities Torpedo (Program Element 63691N, 64575N), Common Antisubmarine Warfare Standoff Weapons (Program Element 63367N, project S1669), Submarine Launched Mobile Mine (Program Element 64601N, project S0272), and the SSN 688 Class Vertical Launch System (Program Element 64370N). The program also modifies MK 117 Fire Control System hardware and software to accommodate the following developments in sensor/targeting systems which interface with the Fire Control System: Wide Aperture Array (Advanced) (Program Element 63590N); Over-The-Horizon Targeting (Program Element 63530N, project X0798); Acoustic Performance Prediction (Program Element 63708N, project S0823); Submarine Sonar Improvement (Program Element 64503N, project S0219); Attack Submarine Integrated Communications System (Program Elements 64524N and 64505N, project X1411) and Navigation Systems (Program Element 64514N). In addition, the program coordinates MK 117 Fire Control System improvements with the Submarine Advanced Combat Systems (Engineering) program (Program Element 64524N, project S1347) to ensure that the MK 117 Fire Control System development benefits as much as possible from the advanced concepts and technological improvements generated by the top-down design of this next-generation combat system. To avoid duplicative efforts, the Attack Submarine Combat Control System Improvement (Engineering) program maintains liaison with the TRIDENT program (Program Element 11228N, project B0004), which is developing related applications of standard information displays for digital command/fire control systems. Project S0366 MK 48 Advanced Capabilities (Engineering): Concurrent advanced development of the Advanced Capabilities torpedo is funded in project S0311 (MK 48 Advanced Capabilities (Advanced)) which is contained in Program Element 63562N (Submarine Tactical Warfare Systems (Advanced)) in FY 1982 and prior years and transfers to Program Element 63691N in FY 1983. Project S0366 transfers to Program Element 64575N (MK48 Advanced Capabilities (Engineering)) in FY 1983.

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL (lead laboratory, Submarine Acoustic Warfare Systems), Naval Sea Systems Command, Washington, DC; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Underwater Systems Center, Newport, RI (lead laboratory, Attack Submarine Combat Control Systems Improvement Program); Naval Ocean Systems Center, San Diego, CA; Naval Surface Weapons Center, Silver Spring, MD; Naval Electronics Systems Command, Washington, DC; Naval Weapons Center, China Lake, CA; Naval Undersea Warfare Engineering Station, Keyport, WA (lead laboratory, MK 48 Advanced Capabilities Torpedo); Naval Research Laboratory, Washington, DC, and two others. Contractors: Gould Inc., Cleveland, OH; Sippican, Marion, MA; Sperry Gyroscope, Great Neck, NY; Sperry-Rand-Univac, Minneapolis, MN; Hughes Aircraft, Fullerton, CA (prime contractor MK 48 Advanced Capabilities Torpedo); Singer-Librascope Division, Glendale, CA; Raytheon, Portsmouth, RI; Lockheed Missiles and Space Corporation, Sunnyvale, CA; Rocketdyne Division, Rockwell International, Canoga Park, CA; Electric Boat Divison, General Dynamics Corporation, Groton, CT; Bolt, Beranek & Newman, Inc., Cambridge, MA; Applied Research Laboratory, Pennsylvania State University, State College, PA; Applied Research Laboratory, University of Texas, Austin, TX; Bunker-Ramo Corp., Westlake, CA.

Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0235 Submarine Acoustic Warfare Systems: The AN/WLR-9A, AN/BLR-14, Countermeasure Set Acoustic MK 1 Mod 0, Acoustic Device Countermeasure MK 2 Mod 0 and Mobile Submarine Simulator were service approved and production contracts have been awarded. The submarine Expendable Bathythermograph system's expendable unit was redesigned, tested and service approved, December 1975. Its inboard system (AN/BQH-7) was service approved in April 1979. Awarded production contract for the sensitivity improvements for AN/WLR-9A. Commenced fabrication of the advanced torpedo decoy MK 3 engineering development models. Continued first-article testing of Multi-Frequency Spot Jammer Engineering Development Models. Continued Mobile Submarine Simulator near term improvement engineering development. Continued fabrication of submarine external countermeasure launching systems. Continued computer simulation, system analysis and integration studies to evaluate effectiveness, define performance parameters and improve operating guidelines and tactical use of acoustic warfare systems. S0236 Attack Submarine Combat Control Systems Improvement Program (Engineering): The program was initiated in FY 1973 with accomplishment of fundamental design study work in the Command and Fire Control System areas. Based on this effort, Engineering Development of all digital fire control system MK 117 for attack submarines was started. The basic design of the MK 117 fire control system and an integrated attack submarine combat systems test and evaluation facility were completed. Contracts for the development of new fire control equipments and the attack submarine combat control systems test facility equipment were awarded in FY 1974 and FY 1975. Completed factory acceptance and environmental testing of the MK 117 fire control system. Technical certification and operational evaluation of the system onboard USS GUITARRO (SSN 665) and USS SILVERSIDES (SSN 679) were conducted in FY 1978 and FY 1979. The MK 117 fire Control System was approved for service use in July 1980. Follow-on combat system improvements have been identified for development based on operational requirements. These include attack submarine improved command displays and integration of TOMAHAWK/Over-the-Horizon Targeting capabilities in the MK 117 Fire Control System, which becomes the Combat Control System MK 1 when these capabilities are included. Software coding for program "C" Revision 1 (TOMAHAWK/Over-the-Horizon Targeting) and Revision 2 (Electrically Suspended Gyro Navigation capability) commenced in June 1981. S0366 MK 48 Advanced Capabilities (Engineering) Program: menced size and weight reduction studies for engineering development model torpedoes. Concurrent advanced development con. ued in FY 1981 in Program Element 63562N, project S0311.

2. (U) FY 1982 Program: S0235 Submarine Acoustic Warfare System: Complete engineering development model fabrication and Navy testing of the Advanced Torpedo Decoy MK 3. Commence technical evaluation (development testing II) of Multi-Frequency Spot Jammer engineering development models. Complete fabrication, deliver and install engineering development model of the strategic submarine external countermeasure launching system and commence technical evaluation (development testing II). Continue fabrication of engineering development launching module for attack submarines. S0236 Attack Submarine Combat Control System Improvement (Engineering) Program: Continue follow-on operational testing and development of tactical programs and combat system equipment. Continue development of digital equipment for operation and control of weapons and launchers to support new construction attack submarines and continue development of data processing subsystem improvements to support interfacing new sensor systems; i.e., data links, electronic warfare support measures and off-board/third party sensors. Continued development and integration testing of MK 117 fire control system Tactical Program "C" Revision 0. Continue development of Tactical Program "C" Revision 1 with

Program Element: 64562N Title: Submarine Tactical Warfare Systems (Engineering)
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TOMAHAWK and Over-The-Horizon Targeting and of Tactical Program "C" Revision 2 with Electrically Suspended Gyro Navigation capability. Complete definition of contact motion analysis/target motion analysis techniques using multi-sensor data. Complete specifications and system architecture plans for Combat Control System MK 1 modifications to support the MK 48 Advanced Capability Torpedo, TOMAHAWK Vertical Launch system and fleet recommended improvements. Continue operation and development of the Combat Control System Test Facility to support developments, integration and updating of tactical combat control programs. Continue development and use of end-to-end combat analyses and system design efforts. Provide support to related attack submarine combat system programs such as the MK 48 Advanced Capabilities torpedo, the SSN 688 Vertical Launch and the Common Anti-Submarine Warfare Standoff Weapon program. SO366 MK 48 Advanced Capabilities (Engineering): Continue full-scale engineering development. Award contract with prime contractor for forty engineering development torpedo modificatons and three sets of automatic test equipment.

3. (U) FY 1983 Planned Program: SO235 Submarine Acoustic Warfare System: Continue engineering development of the Advanced Torpedo Decoy MK 3, Multi-Frequency Spot Jammer MK 5 and the submarine external launching systems. Commence engineering development of acoustic warfare system display improvement. Complete Navy testing and fabrication of service test models of the Advanced Torpedo Decoy MK 3. Complete technical evaluation and conduct operational evaluation (Operational Test II) of Multi-Frequency Spot Jammer MK 5 and strategic submarine external countermeasures launching system. Complete fabrication of attack submarine engineering development launching module. Complete display improvement engineering development specification and commence hardware fabrication. Continue simulation, system analysis, and integration studies to evaluate effectiveness, define performance parameters, and improve operating guidelines and tactical use of acoustic warfare systems. SO236 Attack Submarine Combat Control System Improvement Program (Engineering): Continue follow-on operational testing and development of combat system equipment and tactical programs. Develop attack submarine combat system fire control and data processing equipment to support incorporation of sensor data provided by the towed array, data links, electronic warfare support measures and off-board/third party sensors. Complete development and certification of Program "C" Revision 1 which provides TOMAHAWK and over-the-horizon targeting capabilities. SO366 MK 48 Advanced Capabilities (Engineering): Program continues in Program Element 64575N. See the corresponding Descriptive Summary.

4. (U) FY 1984 Planned Program: SO235 Submarine Acoustic Warfare System: Obtain approval for service use for the Multi-Frequency Spot Jammer MK 5 and strategic submarine external launching system. Conduct technical (development testing II) and operational (operational testing II) evaluation of the attack submarine external launching module. Complete technical evluation and commence operational evaluation of the Advanced Torpedo Decoy MK 3. Commence fabrication of acoustic warfare system display improvement. Commence engineering development of the noise augmentation system. Continue simulation, system analysis, and integration studies to evaluate effectiveness, define performance parameters and improve operating guidelines and tactical use of acoustic warfare systems. SO236 Attack Submarine Combat Control System Improvement Program (Engineering): Continue simulation, system analysis and integration studies to evaluate effectiveness, define performance parameters and improve operating guidelines and tactical use of the attack submarine combat system. Complete development and certification of Tactical Program "C" Revision 2

and continue follow on operational testing. Continue development of Over-the-Horizon Targeting system improvements utilizing improved communications equipment. Continue development of combat control system equipment and software functional improvements needed to implement Vertical Launch, Advanced Capability Torpedoes, ASW weapons and mines. S0366, MK 48 Advanced Capabilities (Engineering): Refer to the Descriptive Summary for Program Element 64675N.

5. (U) Program to Completion: S0235 Submarine Acoustic Warfare Systems: This is a continuing program. S0236 Attack Submarine Combat Control System Improvement (Engineering) Program: This is a continuing program. S0366 MK 48 Advanced Capabilities (Engineering): Refer to the Descriptive Summary for Program Element 64675N.

6. (U) Milestones: See descriptive summaries for project S0235 (Attack Submarine Combat Control System Improvement (Engineering) Program) and project S0366, (MK 48 Advanced Capabilities (Engineering)).

Project: S0236 Title: Attack Submarine Combat Control Systems Improvement (Engineering)

Program Element: 64562N Title: Submarine Tactical Warfare Systems (Engineering)

DoD Mission Area: 233 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: It is essential that the qualitative superiority of U.S. attack submarines be maintained. This requires continued emphasis on research and development programs to provide improved overall total attack submarine operational performance relative to the projected threats by providing improved sensors, weapons and platforms, and by enhancing the attack submarine Commander's ability to make tactical decisions. The operating environment and warfare tasks of attack submarines have increased the demands for rapid receipt, assimilation, processing, and display of tactical data. In addition to operating as independent search and attack units, attack submarines operate in coordination with other units. In these roles, the attack submarine must be able to detect, classify and track large numbers of contacts, provide adequate location and identification information, and simultaneously maintain continuous orientation with respect to other friendly units. Therefore, development of an integrated tactical command/fire control system is required to improve combat system effectiveness by reducing reaction times, optimizing system capabilities and incorporating developments in attack submarine sensors and weapons. Current and evolving digital technology is being used to achieve these system goals. Utilization of digital technology promotes standardization and integration across tradit. al combat subsystem boundaries resulting in the reduction of procurement and life cycle costs. Additionally, current in-service analog systems are no longer in production and are difficult to maintain and modify to accommodate improvements. Utilization of standard displays and processors provides logistic and training commonality, hardware flexibility and reductions in space, weight and cost. The focal point of the attack submarine combat system is the command/fire control system. The Attack Submarine Combat Control System Improvement (Engineering) Program, formerly the Submarine Integrated Attack Center Program, is the primary development, system engineering, test and evaluation effort for attack submarine combat system design, subsystem interfaces, and the attack submarine combat control system. Integration of sensor data provided by other subsystems and the weapon control systems of the attack submarine combat system into the command function is also accomplished in the Attack Submarine Combat Control System Improvement (Engineering) Program. This program considers the total attack submarine combat system and accounts for the interrelationships of both platform and combat subsystems (functions and characteristics). Combat subsystems such as sonar, electronic warfare support measures, weapons, navigation, and communications must be considered in relationship with platform related factors such as speed, depth, maneuverability, ownship acoustic characteristics, and vulnerability/survivability. The principal objective of the program is to increase combat system effectiveness by developing improvements to the attack submarine combat system overall architecture and to those subsystems which directly support the command management function. These include the attack submarine Commanding Officer's tactical evaluation and display system, the fire control system, and those components (data processing, data transfer and display equipments) required to coordinate and utilize subsystem data. Attack Submarine Combat Control System Improvement (Engineering) Program developments are phased, where appropriate, to coincide with attack submarine shipbuilding and improvement programs. These developments are designed to provide a mechanism for incorporating improved sonar and other sensor capabilities into the Command/Fire Control Subsystem of the Combat System and are adaptable to both current new construction and in-service attack submarines (through a back-fit program). The initial efforts of the Attack Submarine Combat Control System Improvement (Engineering) Program supported development of the digital weapon control equipment (Mk 82 Weapon Data Converter and Mk 92 Attack Control Console) and the computer programs utilized in the MK 117 Fire Control System. The remaining components of the MK 117 fire control system consist of standard Navy tactical

Project: S0236 Title: Attack Submarine Combat Control Systems Improvement (Engineering)

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digital processing equipment and equipment previously developed and tested for the MK 113 Mod 10 fire control system. The MK 117 fire control system is being installed in SSN 688 Class submarines (front-fit) commencing with SSN 700 and SSN 594/637 Class submarines and SSN's 688-699 (backfit). With the completion of the MK 117 fire control system operational evaluation and approval for service use in 1980, this project is focused on efforts to upgrade attack submarine combat control systems as required to increase capability and effectively respond to the changing threat. A key part of the Attack Submarine Combat Control System Improvement (Engineering) Program effort is the development of a test and evaluation facility at which hardware, software, and system reconfigurations, modifications and alterations can be tested for performance, reliability and interfaces before production and shipboard installation. The program also develops, integrates and certifies attack submarine command fire control, and data processing subsystem improvements for installation in follow-on SSN 688 Class submarines and for backfitting into existing attack submarine platforms where appropriate. These developments include changes as recommended by the Attack Submarine Combat System Computer Program Improvement Control Board and operational improvements required to counter changing threats as directed by Chief of Naval Operations. The most significant of these changes include incorporation and utilization of target information and data from multi-sensors; e.g., data links, electronic warfare support measures, towed array and hull mounted acoustic sensors and off-board/third party sensors. Specific efforts include development of Command System Displays (Operating Summary, Search Planning, Avoidance, Detection), target motion analysis and weapon control modules, torpedo telemetry communication and incorporation of new weapon capabilities; and data processing system improvements required to utilize these sensor/data management improvements. Additionally, this program performs attack submarine combat system engineering analysis efforts required to develop a long term system architecture and to conduct effectiveness evaluations (end-to-end) of the entire combat system.

(U) RELATED ACTIVITIES: The Attack Submarine Combat Control System Improvement (Engineering) Program modifies MK 117 Fire Control System hardware and software to accommodate new and improved submarine launched weapons and launch capabilities including TOMAHAWK (Program Element 64367N, project X0545), MK 48 Advanced Capabilities Torpedos (Program Elements 63691N and 64675N, Common Anti-Submarine Warfare Standoff Weapons (Program Element 63367N, project S1669), Quickstrike (Program Element 64601N, project S0272) and the SSN 688 Vertical Launch System (Program Element 64370N). The program also modifies MK 117 Fire Control System hardware and software to accommodate the following developments in sensor/targeting systems which interface with the Fire Control System: Wide Aperture Array (Advanced) (Program Element 63590N); Over-The-Horizon Targeting (Program Element 63530N, project X0798); Acoustic Performance Prediction (Program Element 63708N, project S0823); Submarine Sonar Improvement (Program Element 64503N, project S0219); Attack Submarine Integrated Communications System (Program Elements 64505N and 64524N, project X1411) and Navigation Systems (Program Element 64514N). In addition, the program coordinates MK 117 Fire Control System improvements with the Submarine Advanced Combat Systems (Engineering) program (Program Element 64524N) to ensure that the MK 117 Fire Control System development benefits as much as possible from the advanced concepts and technological improvements generated by the top-down design of this next-generation combat system. To avoid duplicative effort, the Submarine Combat Control System Improvement (Engineering) program maintains liaison with the TRIDENT program (Program Element 1122RN, project R0004), which is developing related applications of standard information displays for digital command/fire control systems.

Project: S0236 Title: Attack Submarine Combat Control Systems Improvement (Engineering)

Program Element: 64562N Title: Submarine Tactical Warfare Systems (Engineering)
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(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, Newport, RI (lead laboratory); Naval Sea Systems Command, Washington, DC; Naval Electronics Systems Command, Washington, DC; Naval Air Systems Command, Washington DC; David Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Surface Weapons Center, White Oak, MD. Contractors: Hughes Aircraft, Fullerton, CA; Singer Corp., Librascope Division, Glendale, CA; Sperry-Rand, Univac, St. Paul, MN (prime contractors); Raytheon, Portsmouth, RI; Rockwell International, Autonetics Div., Los Angeles, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Attack Submarine Combat Control Systems Improvement (Engineering) program was initiated in FY 1973 with the accomplishment of fundamental design study work in the Command/Fire Control System area. Based on this effort, engineering development of an all digital fire control system (MK 117) for attack submarines was started. During this period, the basic design of the MK 117 fire control system and the Combat Control Systems Test and Evaluation facility was completed. Contracts for the development of new fire control equipments and test facility were awarded in FY 1974 and FY 1975. Additionally, development of the arrangement and operational design features of the first all-digital attack center was initiated. Included in this design effort was the development of: attack submarine command, fire control, weapon utilization improvements, evaluation of potential integrating elements, and establishment of display console and data processor requirements. Technical evaluation of prototype equipments, system mating, fault testing, factory acceptance, and environmental testing of the new MK 117 fire control system hardware, the MK 82 Weapon Data Converter and MK 92 Attack Control Console components conducted. Completed MK 117 fire control system hardware and software integration, mating tests and installation and checkout of the first twenty-eight attack submarine systems. Additional installations are in process. Completed development and integration of MK 117 fire control system Tactical Program "B" and conducted technical and operational evaluations. Initiated development of attack submarine combat system engineering analysis techniques to establish a long term combat system architecture. Initiated development of an improved attack submarine combat control system configuration and associated functional components (Command, fire control system and data processing) to support identified operational requirements for both new construction and in-service attack submarines. Conducted follow-on operational testing and evaluation and obtained approval for service use; continued tactical program evaluations. Continued development and integration of MK 117 Fire Control System equipment and Tactical Program C modifications to incorporate MK 48 Torpedo Telemetry Control, TOMAHAWK, Target Motion Analysis and data processing system improvements to support interfacing new sensor systems; i.e., data links, electronic warfare support measures and off-board/third party sensors. Established system design specifications and initiated efforts to incorporate tactical data from communication data links, and data from off-board/third party sensors. Continued development and testing of command displays, target localization techniques and data processing system improvements. Established equipment modifications required to support operational and reliability requirements. Continued combat system architecture and design efforts, including evaluation of program effectiveness, to define system design

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and performance specification for an improved submarine combat control system and tactical program to support introduction of new capabilities and enhance overall system reliability. These efforts include modularization of the system by function to provide flexibility and software transferability between systems. Software coding for Revision 1 (TOMAHAWK/Over-the-Horizon Targeting) and Revision 2 (Electrically Suspended Gyro Navigation Capability) commenced in June 1981.

2. (U) FY 1982 Program: Continue follow-on operational testing and development of combat system equipment and tactical programs. Complete development and integration testing of MK 117 fire control system Tactical Program "C" Revision 0. Develop attack submarine combat system fire control and data processing equipment to support incorporation of sensor data provided by the towed array, data links, electronic warfare support measures and off-board/third party sensors. Establish Combat Control System Architecture and specifications to support implementation of MK 48 Advanced Capabilities Torpedoes, SSN 688 Vertical Launch, and fleet recommended improvements. Initiate development of the functional components to support this architecture.

3. (U) FY 1983 Planned Program: Continue follow-on operational testing and development of combat system equipment and tactical programs. Complete development and certification of Program C Revision 1. Continue development of Tactical Program C Revision 2 with Electrically Suspended Gyro Navigator capability. Initiate development of Over-the-Horizon targeting and tactical data link communication system improvements. Continue development and incorporation of fleet recommended fire control/command system improvement. Continue development of combat control system design modifications, both hardware and software, to support deployment of MK 48 Advanced Capabilities Torpedoes, SSN 688 Vertical Launch and related fleet recommended improvements. Continue operation of the Combat Control System Test Facility to support Program C Revision 2, Over-the-Horizon Targeting, Program C Revision 3 (Fire Control System update) and Program C Revision 4 (SSN 688 Vertical Launch) tactical program developments and integration testing. Continue evaluation of combat system program to determine overall effectiveness and development of basic functional components; target motion analysis and command techniques.

4. (U) FY 1984 Planned Program: Continue follow-on operational testing anddevelopment of combat system equipment and tactical programs. Complete development and certification of tactical Program C Revision 2. Complete Over-the-Horizon Targeting Subsystem modification which utilizes improved communication system hardware interfaces. Continue development of Combat Control system equipment hardware interfaces. Continue development of Combat Control system equipment and software functional improvements needed to implement MK 48 Advanced Capability Torpedoes, SSN 688 Vertical Launch, Common ASW Standoff Weapon, and Submarine Launched Mobile Mines. Continue system design and performance evaluation efforts and operation of the Combat System Test Facility.

5. (U) Program to Completion: This is a continuing program to evolve and support existing fire control systems on SSN 594, 637 and 688 classes and to provide inputs to the Submarine Advanced Combat System program for future combat systems. The program continues to support the Attack Submarine Combat Control System Test Facility. The program will continue operational testing,

Project: S0236 — Title: Attack Submarine Combat Control Systems Improvement (Engineering)

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Incorporate fleet recommended improvements as directed by the Chief of Naval Operations, develop attack submarine command, fire control data processing techniques, and complete development and delivery of required Tactical Program updates to deploy new weapon and sensor capabilities. These capabilities include MK 48 Advanced Capabilities Torpedoes, Common ASW Standoff Weapons, Submarine Launched Mobile Mines, Over-the-Horizon Targeting and sonar improvements. The test facility will continue to be utilized to develop, test and evaluate attack submarine combat system improvements required to ensure effective systems are available to respond to the changing threat. Additionally, the Combat Systems' Architecture and Development Plan will be maintained current by continuing analyses of the threat and effectiveness evaluations of combat system developments.

6. (U) Milestones:

	Milestone	Date
a.	Started Mk 81 modifications	Aug 1972
b.	Commenced outfitting Test and Evaluation Facility	Aug 1973
c.	Awarded Mk 82/Mk 92 development contracts	Dec 1973
d.	Started design of Command Subsystem Developments	Jan 1975
e.	Received prototype Mk 82/Mk 92 equipment	Aug 1975
f.	Completed reliability, maintainability and performance testing of Mk 117 fire control system equipment	Aug 1976
g.	Completed basic Mk 117 fire control system computer program	Dec 1976
h.	Completed MK 117 Technical Evaluation	Dec 1977
i.	Conducted MK 117 Operational Evaluation	Jun 1978
j.	MK 117 Fire Control System approved for service use	Jul 1980
k.	Deliver MK 117 Fire Control System Tactical Program "C" Revision 0	(Sep 1981)*
l.	(1) Complete Incorporation of TOMAHAWK into Program "C" Revision 1 (2) Complete Incorporation of TOMAHAWK into Program "B" Revision 2G	
m.	Complete Incorporation of Submarine Tactical Data Link/Over-The Horizon Targeting into Program "C" Revision 1	
n.	Certify and Deliver Tactical Program "D"	
o.	Deliver Combat Control System MK 1 Tactical Program	
p.	Complete Tactical Program "D" Operational Testing	
q.	Certify and Deliver the Over-the-Horizon Targeting Block Update	
r.	Complete Development of Tactical Program "C" Revisions to Incorporate MK 48 Advanced Capabilities and SSN 688 Vertical Launch	
s.	Complete Operational Testing Programs Which Incorporate MK 48 Advanced Capabilities and SSN 688 Vertical Launch	

Project: S0236 Title: Attack Submarine Combat Control Systems Improvement (Engineering)

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* Dates shown in FY 1982 Descriptive Summary. Milestones 6k, 1(i), and m changed and milestone 61(2)added to reflect phased development of TOMAHAWK and Over-the-Horizon Targeting software. Milestone 6n and 6p have been deleted due to restructuring of the program. Milestones 6o and 6q through 6s were not shown on the FY 1982 Descriptive Summary and reflect subsequent program restructuring.

7. (U) Resource:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
S0236	Attack Submarine Combat Control Systems Improvement	24,832	30,772	30,560	31,127	Continuing	Continuing

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(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) The basic MK 117 Fire Control System, which incorporates digital weapon control, is an improved version of the MK 113 Mod 10 Fire-Control System. All development testing was completed in August 1977.

b. (U) Modifications to the MK 82 Weapons Data Converter, MK 92 Attack Control Console and other MK 117 Fire Control System Hardware (Torpedo Room components, weapon simulators, sensor interface units and display components) are currently being designed and tested. These modifications support incorporation of new weapons (Torpedo MK 48 Telemetry Communication, TOMAHAWK) and utilization of sensor data from Electronics Support Measures, tactical data links, offboard third party sensors, and sonar improvements (towed and hull array enhancements). These modifications to the basic MK 117 Fire Control System will be evaluated in the Land Based Test Facility located at the Naval Underwater Systems Center, Newport, RI and then installed in MK 117 platforms. Testing of TOMAHAWK related equipment is ongoing on the SSN 665.

c. (U) Revisions to the current operational MK 117 Program B, Revision 1 software program are being developed to support fleet introduction of sonar improvements and new weapons; frequency line tracking, towed array target motion analysis, TOMAHAWK, and Torpedo MK 48 MOD 4. This revision, denoted Program C Revision 0 will be be certified for fleet delivery in April 1982. Subsequent modifications to Program C Revision 0 provide data link targeting and TOMAHAWK weapon control. These improvements will be evaluated during the TOMAHAWK Operational Evaluation and will be certified in April 1983 for Follow-on Test and Evaluation.

2. (U) Operational Test and Evaluation:

a. Testing to Date. Upon completion of Operational Test and Evaluation, the Chief of Naval Operations granted Approval for Service Use for the MK 117 Fire Control System in July 1980 (Chief of Naval Operations ltr ser 401/C73238 of 31 July 1980).

b. Future Testing. Follow-on operational test and evaluation of the MK 117 Fire Control System will continue as corrections and enhancements are incorporated into the system. Operational Test IIIB, an operational evaluation of a major software improvement, program C Revision 0, will be conducted as required by OPNAVINST 3960.10A. The objective of Operational Test IIIB will be to provide confidence in software program C Revision 0's operational effectiveness and suitability and to provide a recommendation to the Chief of Naval Operations regarding the program's readiness for operational use. Operational Test IIIB testing will incorporate monitoring of land-based and at-sea certification testing of software program C Revision 0, land-based and at-sea testing of precursors to software program C Revision 0, and a dedicated land-based and at-sea operational evaluation. It is envisioned that Operational Test IIIB will be the final, major test conducted for the MK 117 Fire Control System as future

refinements (e.g., the incorporation of a TOMAHAWK weapon capability), will be introduced as software and hardware changes to the Combat Control System MK 1. Testing of the Combat Control System MK 1 will be conducted under Chief of Naval Operations Project 234-2 and will return to Operational Test II level testing for preprocurement operational evaluation. The Combat Control System MK 1 will be both forward fit and back fit in place of the MK 117 Fire Control System.

3. (U) SYSTEM CHARACTERISTICS:

a. Technical

Characteristic	Threshold/Goal	Demonstrated
System Reliability (Mean Time Between Failures)	-/500 hours	--
System Maintainability (Mean Time to Repair)	-/3.4 hours	--
Digital Equipment (Mean Time to Repair)	20 min/15 min	20 min
Correlate Sensor Data,		
Localize and Track Targets		
(1) Number of Targets, Normal Mode	[redacted]	
(2) Number of Targets, Degraded Mode		
(3) Target Motion Analysis Solution Time		
(4) Target Motion Analysis Solution		
Computer-Aided Correlation of Environment		

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Characteristic	Threshold/Goal	Demonstrated
Develop Orders, Set and Control Weapons (1) Torpedo MK 37 (2) Torpedo MK 48 (3) Missile, HARPOON (4) Missile, (SUBROC)	[redacted]	[redacted]
b. Operational		
Fire Control Solution, Speed and Accuracy	Better than Fire-Control System MK 113 6/8/10	Yes (note 6)
Target Motion Analysis Solution for Weapon Acquisition	(note 3)	0.81 (note 4) 0.30 (note 5)
Accurately Determine and Enter Weapon Settings	(note 3)	(note 6)
Snapshot Weapon Firing Response Time	Better Than Fire-Control System MK 113 6/8/10	(note 7)
Operational Availability		
CONDITION I	99%	99.6%
CONDITION III	96%	98.4%
Operational Reliability	0.8%	(note 8)
Hardware		0.76
Software		0.82
System		0.64

Note 1: Time required to obtain solution is a factor of sensor data quality and tactics.

Project: S0236
Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Attack Submarine Combat Control Systems Improvement Program
Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Program

Note 2: [redacted]

Note 3: Solution quality required is a function of weapon characteristics.

Note 4: [redacted]

Note 5: [redacted]

Note 6: [redacted]

Note 7: [redacted]

Note 8: Specification is for a system reliability of at least a 0.8 probability for completing a 24-hour mission at a 90 percent confidence level.

Project: S0366 Title: MK 48 Advanced Capabilities (Engineering)
Program Element: 64562N Title: Submarine Tactical Warfare Systems (Engineering)
DoD Mission Area: 733 - Anti-Submarine Warfare Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Recent and predicted advances in Soviet submarine design and capability will reduce the effectiveness of the Torpedo MK 48[ ] The use of[ ] These Soviet capabilities dictated the requirement for improvements in torpedo MK 48 guidance and control and warhead exploder subsystems. The feasibility of achievir required performance improvements by using digital processing[ ]made possible with improved components and technology has been demonstrated. Modification of twenty-four MK 48 torpedoes into advanced development models was initiated in FY 1980 for Development Test and Evaluation and Initial Operational Test and Evaluation. Subsequent threat assessments revealed increased speed and depth capabilities of the Soviet ALFA submarine with corresponding reduction in Torpedo MK 48 probability of kill against such targets. This dictated further modification of Torpedo MK 48 subsystems including improved propulsion and fuel storage capability. As a result, added modification of torpedo MK 48 afterbody and fuel tank sections commenced in FY 1980. Modification of forty MK 48 torpedoes into engineering development models for Technical and Operational Evaluation will be initiated in FY 1982.

(U) RELATED ACTIVITIES: Concurrent advanced development of the Advanced Capabilities Torpedo is funded in project S0311 (MK 48 Advanced Capabilities (Advanced)) which is contained in Program Element 63562N (Submarine Tactical Warfare Systems (Advanced)) in FY 1982 and prior years and transfers to Program Element 63691N in FY 1983. Project S0366 transfers to Program Element 64675N (MK 48 Advanced Capabilities (Engineering)) in FY 1983.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Undersea Warfare Engineering Station, Keyport, WA (lead laboratory); Naval Underwater Systems Center, Newport, RI; Naval Ocean Systems Center, San Diego, CA; Naval Coastal Systems Center, Panama City, FL and Naval Research Laboratory, Washington, DC. Contractors: Applied Research Laboratory, Pennsylvania State University, State College, PA; Applied Research Laboratory, University of Texas, Austin, TX; Hughes Aircraft Company, Fullerton, CA (prime contractor); Gould Inc., Cleveland, OH.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Commenced size and weight reduction studies for the engineering development model in FY 1981. Concurrent advanced development continued in FY 1981 in Program Element 63562N, project S0311.

2. (U) FY 1982 Program: Continue concurrent engineering development program. Award Engineering Development Phase contract with prime contractor to fabricate forty torpedo Advanced Capability modifications and three sets of automatic test equipment. Advanced development continues in Program Element 63562N, project S0311.

3. (U) FY 1983 Planned Program: Program transfers to Program Element 64675N. Refer to the corresponding Descriptive Summary.

Project: S0366
Program Element: 64562N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capabilities (Engineering)
Title: Submarine Tactical Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Program continues in Program Element 64675N. Refer to the corresponding Descriptive Summary.

5. (U) Program to Completion: Program completes in Program Element 64675N. Refer to the corresponding Descriptive Summary.

6. (U) Milestones

Milestone	Date
a. Award Advanced Capabilities Engineering Development Model Contract	(Mar 1981)* Jun 1982
b - f (These milestones, scheduled in FY 1983 and later, are shown in the Descriptive Summary for Program Element 64675N).	

* Date shown in FY 1982 Descriptive Summary. Contract award delayed due to restructuring of the program.

7. (U) Resource:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
S0366	MK 48 Advanced Capabilities (Engineering)	6,800	62,492	(166,271)1/	(111,483)1/	(31,414)1/	(378,640)1/
	(Quantity - Engineering Development Torpedo Modifications)		(40)2/				(40)2/
	(Quantity - Engineering Development Model Automated Test Equipment		(3)2/				(3)2/

1/ Project S0366 transfers to Program Element 64675N (MK 48 Advanced Capabilities (Engineering)) in FY 1983. Estimates shown in parentheses are provided for convenience and do not conribute to the FY 1983 and later total for Program Element 64562N. The total cost estimate applies to the engineering development phase (Program Element 64562N and 64675N) only.
2/ Development/Operational Test and Evaluation.

(U) TEST AND EVALUATION DATE: Refer to the Descriptive Summary for Program Element 64675N.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64566N
Title: Acoustic Communications (Engineering)
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	3,229	5,099	4,696	2,650	Continuing	Continuing
S0252	Acoustic Communications (Engineering)	3,229	5,099	4,696	2,650	Continuing	Continuing
	(Low Data-Rate Integrated Acoustic Communications)	(1,013)	(180)	(0)	(0)	(0)	(63,208)
	(Quantity -						
	- Aircraft System Advanced Development Model						(2)1/2/
	- Aircraft System Engineering Development Model						(1)1/
	- Aircraft System - Preproduction						(6)1/
	- Air-Dropped Two-Way Acoustic Communication Buoy Engineering Development Model						(190)1/
	- Down-Link Communications Sonobuoy, Engineering Development Model						(373)2/
	- Down-Link Communications Sonobuoy - Preproduction						(200)2/
	(Probe Alert Fast Reaction)	(743)	(3,752)	(651)	(0)	(0)	(5,146)
	(Long-Range Call-Up Full Scale Development)	(-)	(-)	(2,564)	(2,650)	(Continuing)	(Continuing)
	(Quantity -						
	- Probe Fast Reaction Advanced Development Model)						(38)2/
	(Medium Data Rate Integrated Acoustic Communications)	(0)	(0)	(0)	(0)	(0)	(12,125)
	(Quantity -						
	- Ship Acoustic Modulator -Demodulator and Controller						(4)1/
	- Special Purpose System Advanced Development Model						(1)1/
	(Other Sub-Tasks)	(1,473)	(1,167)	(1,481)	(0)	(Continuing)	(Continuing)

Notes:
1/ Procured prior to FY 1981 for Development/Operational Test and Evalution.
2/ Development/Operational Test and Evaluation.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element encompasses the development of tactical inter-platform acoustic communications systems for Anti-Submarine Warfare and Coordination in Direct Support (i.e., communications among submarines, surface ships and aircraft). The effort includes a low data rate coded tone capability for submarines, ships and ASW

aircraft (sonobuoys are included for aircraft-to-communications) and development of prototype higher data rate equipments and detection resistant equipment for submarines, a one-way sonobuoy for submarine call-up and a high power one-way system for improved call-up from surface ships, Probe Alert.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue installation, cross-decking and operational testing of the Probe Alert Fast Reaction long range call-up systems built in FY 1981 and FY 1982. Initiate Full Scale Development of militarized long range call-up systems derived from the Probe Fast Reaction program. Decrease in funding from FY 1982 to FY 1983 reflects completion of the Down-Link Communications Sonobuoy development and achievement of its production decision and completion of the Probe Alert Reaction systems 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.

(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: RDT&E - (1) The Medium Data Rate sub-task shown in the FY 1982 Descriptive Summary has been terminated and an estimate of its total cost shown. The Probe Alert Fast Reaction sub-task has been added as shown. FY 1981-1983 funding shown in the FY 1982 Descriptive Summary for the cancelled Medium Data-Rate sub-task has been redistribut ! to current sub-tasks as described below. (2) FY 1981 program element total funding has increased by 855 (the net result of adding 513 in the Low Data Rate sub-task for additional Down-Link Call-Up Buoy engineering development and preproduction models, 743 in the new Probe Alert Fast Reaction sub-task, 762 for other sub-tasks and deletion of the Medium Data Rate sub-task (-1,163)). (3) The FY 1982 estimate has decreased by 1,251 as the net result of Medium Data Rate program termination (-4,385), deferral of the start of the Long-Range Call-Up sub-task from FY 1982 to FY 1983 (-861), procurement of 38 Probe Alert Fast Reaction units (+3,752) and additional funding to other sub-tasks (+63). (4) The FY 1983 estimate has decreased by 2,014 as the net result of termination of the Medium Data-Rate sub-task (-2,586), restructuring of the Long-Range Call-Up sub-task (-648), completion of the Probe Alert Fast Reaction program (+651) and additional funding to other sub-tasks (+569). (5) The total estimated cost of the Low Data Rate Sub-Task has increased by 304 due to changes in the FY 1981 and FY 1982 estimates (+593) and correction of the FY 1982 total estimate (-289). The Medium Data Rate surface ship engineering development model, shown in the FY 1982 Descriptive Summary was not procured due to termination of the Medium Data Rate sub-task. Other Procurement, Navy - The FY 1982 and FY 1983 estimates have decreased by 56 and 111 respectively due to refinement.

(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	1,648	2,374	6,350	6,710	Continuing	Continuing
S0252	Acoustic Communications (Engineering)	1,648	2,374	6,350	6,710	Continuing	Continuing
	(Low Data-Rate Integrated Acoustic Communications)	(404)	(500)	(0)	(0)	(0)	(62,904)

Program Element: 64566N
DoD Mission Area: 345 - Tactical Communications

Title: Acoustic Communications (Engineering)
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
	(Quantity -						
	- Aircraft System Advanced Development Model						(2)1/2/
	- Aircraft System Engineering Development Model						(1)1/
	- Aircraft System - Preproduction						(6)1/
	- Air-Dropped Two-Way Acoustic Communication Buoy Engineering Development Model						(190)1/
	- Down-Link Call-Up Signal, Underwater Sound Buoy, Engineering Development Model)						
	(Medium Data - Rate Integrated Acoustic Communications)	2/					(100)
	(Quantity -	(531)	(1,163)	(4,385)	(2,586)	(Continuing)	(Continuing)
	- Ship Acoustic Modulator-Demodulator and Controller						
	- Special Purpose System Advanced Development Model						(2)1/
	- Surface Ship System Engineering Development Model						(1)1/
	(Long-Range Call-Up)	(-)	2/ (-)	(861)	(3,212)	(Continuing)	(Continuing)
	(Other Sub-Tasks)	(713)	(711)	(1,104)	(912)	(Continuing)	(Continuing)

Notes:
1/ Procured prior to FY 1980 for Development/Operational Test and Evaluation.
2/ Development/Operational Test and Evaluation.

(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	2,042	2,429	1,971	11,647	Continuing	Continuing
Aircraft Procurement. Navy	2,174	3,008	2,784	3,062	0	11,028
(Quantity - OV-78/A Generator Processor (no Advanced Signal Processor for P3C Aircraft))	(37)	(48)	(34)	(46)	(0)	(165)

Program Element: 64566N
Title: Acoustic Communications (Engineering)
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Among the primary advantages of the attack submarine are concealment and the ability to operate in a manner that takes advantage of the optimum acoustic environment. Close coordination with air, surface and submarine forces is dependent upon rapid, reliable and real time communications. Currently, all such communications degrade the concealment and flexibility of the submarine. The requirement exists for a family of platform equipments which will permit the submarine to communicate with no restrictions on its tactical posture. The Acoustic Communications Systems Project is developing tactical acoustic communications systems for the three Anti-Submarine Warfare platforms: Submarines (SSN 594 and later classes), surface ships and aircraft. The project is divided into several subprograms or phases . The first phase--Low Data Rate System, will provide a low data rate coded tone capability (for long ranges) in addition to an improved voice capability (short ranges) for use in development of tactics and for deployment on high priority missions. The second phase--Medium Data Rate System, will provide a significantly improved higher data rate, more reliable acoustic communications capability by interfacing a programmable signal processor and controller with existing sonars on the various surface ship and submarine classes. A similar signal processor to be used in conjunction with a new relay sonobuoy under development was planned for several aircraft types but the requirement was deleted. In FY 1981 the Chief of Naval Operations first held this program in abeyance and then terminated it in favor of providing the fleet, on a fast reaction basis, with a long range call-up capability for surface ships using coded search sonar signals to call up submarines. This program will equip 24 surface ships and 12 submarines with the Probe Alert system, which is capable of cross-decking to other platforms. Two additional units will be used for detailed testing and configuration control. Funding for the Medium Data Rate Program has been redirected into this effort in FY 1981 through FY 1983. Additionally, integration of the Low Data Rate air processor into the S3A platform will be accomplished under the S3A Weapons System Improvement Program, Program Element 64217N. Under a Quick Reaction Program initiated in 1973, 26 prototype Low Data-Rate transceivers and 58 AN/WQC-5 units were procured in advance of service approval to meet urgent operational requirements in the Mediterranean fleet and are now deployed.

(U) RELATED ACTIVITIES: Submarine Integrated Antenna System Program, Program Element 64502N, Project X0742, uses the electromagnetic frequency spectrum for communications between submarine and surface ship/aircraft/shore station. Acoustic Communications (Advanced), Program Element 63503N, Project S0918 will develop Advanced Acoustic Communications Systems for coordination of attack submarines. Program Element 64503N, project S0219, Submarine Sonar Improvements is integrating the Low Data Rate Integrated Acoustic Communications capabilities into the AN/BQQ-5 sonar. Program Element 64217N, S-3 Weapon System Improvement is integrating the Low Data Rate Integrated Acoustic Communication capability into the S-3 platform.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, New London, CT (lead laboratory); Naval Weapons Systems Center, Crane, IN; Naval Avionics Facility, Indianapolis, IN. Contractors: Sperry Rand, Great Neck, NY; AMETEK-STRAZA, San Diego, CA; General Dynamics, Electric Boat Division, Groton, CT; Honeywell, Seattle, WA; Raytheon Corporation, Newport, RI; Lockheed Aircraft Corporation, Burbank, CA; International Business Machines, Manassas, VA; Magnavox, Fort Wayne, IN; Sparton Corporation, Jackson, MI; Sanders Associates Incorporated, Nashua, NH.

Program Element: 64566N
Title: Acoustic Communications (Engineering)
DoD Mission Area: 345 - Tactical Communications
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Program initiated in 1973. Low Data Rate System: Quick Reaction engineering development of Air-Dropped Two-Way Acoustic Communications buoy completed and production started. Low Data-Rate Aircraft System was validated and approved for service use. Low Data Rate submarine and ship equipments recommended for service use. Coincident with integration of receive capability in the primary attack submarine sonar, submarine equipments started rotation to ships. 100 Down-Link Communications Buoy Engineering Development Models were procured in FY 1980 to meet Development Test III A/B and Operational Test IIIC requirements in FY 1981. An additional 273 Down-Link Communications buoys were procured in FY 1981 for completing technical/operational evaluation in FY 1981 and FY 1982. Medium Data Rate System: AN/SQS-26 Beamformer and AN/SQQ-23 Beam Selector development completed and preproduction models procured. Ship Acoustic Modulator-Demodulator and Controller contract awarded and engineering development models delivered and installed on two attack submarines and frigates. Three tests conducted successfully with Commander, Operational Test and Evaluation Force recommendation for Full Scale Development. Determined feasibility of parametric (non-linear) digital acoustic communications for submarines. Advanced development model Special Purpose System built and installed on an attack submarine in the 3rd quarter, FY 1977 with Commander, Operational Test and Evaluation Force recommendation for Full Scale Development. Wideband Transmission Relay Acoustic Communications development contract awarded August 1977 but terminated in March 1978. In FY 1980, the Medium Data Rate effort was restructured and the parametic system for submarines transferred to Program Element 64503N to begin engineering development. In FY 1981 this effort was terminated and replaced by a fast reaction, long range call-up program. Far Term Program: Azores Fixed Acoustic Range designed, fabricated, implanted and made operational. Azores Fixed Acoustic Range measurement program completed June 1975. Design of Mobile Acoustic Communications Study measurement equipment completed. Equipment built and installed on USS NAUTILUS. Five Mobile Acoustic Communications Study measurement sea trips completed. Tactical Development Support Program: Quick Reaction Program tactical operating guidelines issued. Provided support for Fleet tactical exercises.

2. (U) FY 1982 Program: Low Data Rate System: Achieve production decision for Down-Link Call-Up Buoy and commence production. Long-range call-up system development continues on a fast reaction basis. Subject to technical and operational sea tests in the 3rd and 4th quarter, all necessary experimental work will have been performed and the proposed system will be ready for production in FY 1984 or full-scale development in FY 1983, should changes be necessary prior to production.

3. (U) FY 1983 Planned Program: Low Data Rate System: Continue development of integration of Low Data Rate System signal processor and controller in S3A aircraft under the S3A Weapon System Improvement Program, Program Element 64217N, project WO489. Tactical Development Support Program: Continue support for Fleet Exercises; Long Range Call-Up Program: Complete deployment of fast reaction system and begin Full Scale Development as needed. Decrease in funding from FY 1982 to FY 1983 reflects completion of the Down-Link Communications Sonobuoy development, achievement of its production decision and completion of the Probe Fast Reaction development.

Program Element: 64766N
DoD Mission Area: 345 - Tactical Communications

Title: Acoustic Communications (Engineering)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Continue Low Data Rate integration effort, support for fleet exercises and long range call-up development, if necessary.

5. (U) Program to Completion: Low Data Rate System: Obtain Low Data Rate System capability in S3A aircraft; Tactical Development Support Program: Complete Fleet exercise support. Complete long range call-up development. This is a continuing program to develop acoustic communications equipment to meet fleet requirements.

6. (U) Milestones: Not applicable

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64567N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Subsystem Development/Land Based Test Site
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	45,717	66,394	24,430	28,642	Continuing	Continuing
S0857	Ship Subsystem Dev./LBTS	45,717	66,394	24,430	28,642	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED. Conduct Engineering Development phase of selected systems/subsystems for non-strategic ships in Navy's Shipbuilding Program. Each ship in the Shipbuilding Program must be justified on the basis of mission need. Support land based test sites for systems to be incorporated in designs of ships in the Navy's Shipbuilding Program.

(U) BASIS FOR FY 1983 RDT&E REQUEST: In response to requirements of the shipbuilding program the following ship subsystem developments/Land Based Test Site operations will be supported: Conduct operational test and maintainability demonstration of the LSD-41 Propulsion System at the Land Based Test Site. Identify and resolve interface incompatibilities between new DD-963 Class equipments and the current ship design. Develop test plans and initiate DD-963 software development modifications. Procure various equipments for test at DDGX Advanced Ship System Test Site. Develop detail design of LHDX Combat System Land Based Test Facility. Continue development of inproved, standardized underway replenishment equipment. For SSN-668 Class, continue system integration of the Vertical Launch System, commence development of retractable bow planes, and perform systems integration for inproved sonar systems. 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 this Descriptive Summary are as follows:

Project S0857 Ship Subsystem Dev./LBTS: FY 1981 decrease $9,677 as a result of Congressional action due to changes in the shipbuiding program. FY 1982 was decreased by $11,697 as funds for aircraft carrier reactivation were not provided by the Congress. FY 1983 funds established at $24,430 when decision was made to transfer funding of ship contract design development from RDT&E,N to SCN and to retain ship subsystem development/Land Based Test Site in this project.

Project S1357 FFX: Funds have been deleted by Congress because new design FFX no longer in shipbuilding program.

Program Element: 64567N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Subsystem Development/Land Based Test Site
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	54,655	55,394	89,497	TBD	TBD	TBD
S0857	Ship Contract Designs	54,655	55,394	78,091	TBD	TBD	TBD
S1357	FFX	-	-	11,406	TBD	TBD	TBD

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 64567N
Title: Ship Subsystem Development/Land Based Test Site
DoD Mission Area: 238 - Other Naval Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element supports, on a case basis, the engineering development of specific selected ship systems or subsystems which are required for the effective design of ships in the Navy's Shipbuilding Program. If Land Based Test Sites are required in the engineering development of these systems or subsystems, this program element also provides funds for the planning and operation of the test sites. Prior to FY 1983, this program element also provided the funds required to carry out the Contract Design Phase of non-strategic ships in the Navy's Shipbuilding Program.

(U) RELATED ACTIVITIES: Ship Conform, Program Element 63564N, Submarines Advanced, PE 63561N, AEGIS, PE 64303N, Combat System Engineering Development Site, PE 64304N; Amphibious Assault Craft, PE 63566N; Attack Submarine Development, PE 63569N; DDGX, PE 63589N.

(U) WORK PERFORMED BY: In-House: Naval Ship Systems Engineering Station, Philadelphia, PA; 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; Contractors: General Dynamics, New London, CT; 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: Completed contract design phases for: Salvage Ship (ARS) - a new design for replacement of World War II vintage Salvage ships - lead ship in FY 1981 shipbuilding program, Guided Missile Cruiser (CG-47) - will incorporate AEGIS system - lead ship in FY 1978 shipbuilding program, Landing Ship Dock (LSD-41) - a new class capable of handling Landing Craft Air Cushion - lead ship in FY 1981 shipbuilding program, Cable Repair Ship (T-ARC) - To replace overage T-ARCs - lead ship in FY 1979 shipbuilding program; Ocean Surveillance Ship (T-AGOS) to be primary vehicle for Surveillance Towed Array Sensor (SURTASS) - lead ship in FY 1979 shipbuilding program. Updated Attack Submarine (SSN 688 class) contract design to incorporate class improvements.

2. (U) FY 1982 Program: Complete FY 1982 Fleet Oiler (T-AO) Salvage Ship (ARS), Guided Missile Cruiser (CG-47), Landing Craft Air Cushion and Mine Countermeasures Ship contract design phases. Continue LSD-41 propulsion systems engineering development. Continue Aircraft Carrier Service Life Extension Program contract design phase for first follow ship. Continue design and engineering work required for activation of battleships NEW JERSEY and IOWA. Commence work on other FY 1984 SLN alternatives. Commence FY 1985 Ammunition Ship (AE), FY 1984 Fast Combat Support Ship (AOE), FY 1984 Aircraft Carrier (CVN), FY 1985 Destroyer (DD-963), and FY 1984 Coastal Mine Hunter (MSH) contract design phases. Continue landing, combatant and service craft contract design development. Continue update of Attack Submarine (SSN 688 Class) contract design to incorporate class improvements.

Program Element: 64567N
DoD Mission Area: 238 - Other Naval Warfare

Title: Ship Subsystem Development/Land Based Test Site
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: In response to requirements of the shipbuilding program, the following Ship Subsystem Developments/Land Based Test Site operations will be supported. Conduct operational test and maintainability demonstration of the LDS-41 Propulsion System at Land Based Test Site. Identify and resolve interface incompatibilities between new DD-963 Class equipments and the current ship design. Develop test plans and initiate DD-963 software development modifications. Procure various equipments for test at DDGX Advanced Ship System Test Site. Develop detail design of LHDX Combat System Land Based Test Facility. Continue development of improved, standardized underway replenishment equipment. For SSN-688 Class, continue system integration of the Vertical Launch System, commence development of retractable bow planes, and perform systems integration for improved sonar systems. Funding for FY 1983 is less than FY 1982 due to the transfer of contract design funding from RDT&E,N to SCN.

4. (U) FY 1984 Planned Program: In response to requirements of the shipbuilding program, portions of the following Ship Subsystem Developments/Land Based Test Site Operations will be conducted: LSD-41 Propulsion Land Based Test Site, LHDX Combat System Land Based Facility, DD-963 subsystem engineering development, SSN-688 Class improvement subsystem engineering development and standardized Underway Replenishment Systems engineering development.

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

6. (U) Milestones: Not applicable.

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FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64573N
DoD Mission Area: 371 - Self Protection

Title: Shipboard Electronic Warfare (EW) Improvements
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	7,543	15,917	14,974	17,684	Continuing	Continuing
X0954	Shipboard Electronic Warfare Improvements	7,543	15,917	14,974	17,684	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Shipboard Electronic Warfare systems historically require five to ten years for development, production, and installation with expected in-service life of ten to twenty years. During these periods, the threat to ships is constantly evolving in ways that can seriously degrade the effectiveness of even the latest electronic warfare systems. During the in-service period, exploratory and advanced development efforts are continually developing ways to counter the evolving threat as identified by intelligence collection efforts. This project, initiated in FY 1980, provides the engineering development resources to transform specific exploratory and advanced development efforts into hardware modifications [ ]. Program efforts will address recently identified changes in the anti-ship capable missile threat[ ]

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue the engineering development of [ ] the AN/SLQ-17 and AN/SLQ-32, development of cooperative techniques for integrating onboard deception electronic countermeasures responses with offboard (Decoys) capabilities, the development of [ ] the AN/SLQ-17 and AN/SLQ-32 [ ] the initiation of a low level engineering 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.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The increase of 1,061 in FY 1982 is the result of reprogramming payback of prior year funds. The increase of 45 in FY 1983 is due to inflation adjustments. The increase in FY 1981 of 1,445 is due to reprogramming action to support accelerated Band-3 sensitivity improvements.

Program Element: 64573N
DoD Mission Area: 371 - Self Protection

Title: Shipboard Electronic Warfare (EW) Improvements
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	4,302	6,098	14,856	14,929	Continuing	Continuing
X0954	Shipboard Electronic Warfare Improvements	4,302	6,098	14,856	14,929	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
X0954	Shipboard Electronic Warfare Improvement						
Other Procurement Navy							
	SLQ-32 Isolation Improvement	-	-	2,500	1,430	Continuing	Continuing
				(20)	(11)		
	SLQ-32 Band-3 Sensitivity	-	-	-	26,950	Continuing	Continuing
					(98)		
	SLQ-32 Band-1 Sensitivity	-	-	-	2,500	Continuing	Continuing
					(25)		

Program Element: 64573N
DoD Mission Area: 371 - Self Protection

Title: Shipboard Electronic Warfare (EW) Improvements
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Currently [ ] both the AN/SLQ-17A(V)2 and the AN/SLQ-32(V)3 threat reactive Electronic Countermeasures systems are under procurement. The AN/SLQ-17 is being deployed on aircraft carriers and the AN/SLQ-32 on combatant, auxiliary, and amphibious ships [ ] Although these systems incorporate major improvements in electronic warfare capability over currently deployed systems such as the AN/ULQ-6 and AN/WLR-1, there are advanced state-of-the-art radar guidance techniques, readily implementable in current and future enemy tracking systems (such as the anti-ship cruise missile), which make mandatory the requirement for new countermeasures capabilities. There is evidence that [ ] There is a fleet requirement for long-range threat emitter detection and identification. Major emphasis will be on nullifying threat Electronic Counter Countermeasures which significantly degrade the effectiveness of active electronic countermeasures systems, such as the AN/SLQ-17A(V)2 and the AN/SLQ-32(V)3 and in countering [ ]

(U) RELATED ACTIVITIES: PE 64554N, Surface Electronic Warfare, Engineering Development of AN/SLQ-17A(V)2 and AN/WLR-8(V)4; PE 64568N, Design-to-Price electronic warfare, Engineering Development of AN/SLQ-32 [ ]

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Command, Washington, DC; Naval Research Laboratory, Washington, DC, Naval Surface Weapons Center, Dahlgren, VA. Contractors: Raytheon Inc., Santa Barbara, CA, Hughes Aircraft Corp., Fullerton, CA, Norden Systems, Inc., Norwalk, CT; SWL Inc., McLean, VA; and others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY [illegible]l and Prior Accomplishments: Project initiated in FY 1980. Initiated engineering development of [ ] AN/SLQ-17 and AN/SLQ-32 equipment. Initiated improvements to coordinate effectiveness of active and other electronic countermeasures systems with current and near-term decoy systems. Initiated improvements to [ ] the AN/SLQ-32(V).

2. (U) FY 1982 Program: Continue engineering development and initiate operational test planning for AN/SLQ-32 and AN/SLQ-17A [ ]. Continue development [ ]

Program Element: 64573N
DoD Mission Area: 371 - Self Protection

Title: Shipboard Electronic Warfare (EW) Improvements
Budget Activity: 4 - Tactical Programs

. Initiate ngineering development of (CROSSEYE) Advanced Electronc Warfare System technique as a modification to the AN/SLQ-17 (see Description Summary for PE 63521N, Surface Electronic Warfare).

3. (U) FY 1983 Planned Program: Continue development and initiate test planning for AN/SLQ-32 and AN/SLQ-17A
. Continue development and initiate test planning for AN/SLQ-17A and AN/SLQ-32
. Test and evaluate the integration of AN/SLQ-32
. Continue development of the Advanced Electronic Warfare System modification to the AN/SLQ-17.
Initiate

4. (U) FY 1984 Planned Program: Complete development and test of AN/SLQ-17

Continue 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: 64574N
DoD Mission Area: 235 - Naval Warfare Support

Title: Navy Tactical Embedded Computer Program
Budget Activity: 4 - Tactical Program

(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	17,313	21,979	21,704	13,323	Continuing	Continuing
Z1353	Tactical Embedded Computer	17,313	21,979	19,863	12,273	Continuing	Continuing
X0911	Automatic Data Processing Security	1,852*	934*	1,841	1,050	Continuing	Continuing

*Funded in PE 63526N Z1353 Tactical Embedded Computer:

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Z1353 - Tactical Embedded Computer: Project consists of two computer development efforts, the AN/UYK-43 Navy Embedded Computer System and AN/UYK-44 Militarized Reconfigurable Processor and Computer. The AN/UYK-43 will be available as a software compatible replacement for the AN/UYK-7 standard shipboard tactical computer. The AN/UYK-44 will be available as a reconfigurable processor or computer, in the "microprocessor" and "microcomputer" category, for use in many militarized tactical weapon system applications with low and medium computer performance requirements. The AN/UYK-44 will be software compatible with the AN/UYK-20 and AN/AYK-14 computers. Project is in direct support of Department of Defense Directive 5000.29 "Management of Computer Resources in Major Defense Systems" and the Chief of Naval Material Master Plan for Tactical Embedded Computer Resources. X0911 - Automatic Data Processing: Provides the capability to reduce the vulnerability of Navy automatic data processing systems including command and control, communications intelligence and weapon systems to unauthorized disclosure or modification of data denial of system services. Specifically, develops and validates techniques and hardware/software prototypes which will increase the effectiveness of automatic data processing security, and provides secure multi-level data processing.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Z1353 Tactical Embeded Computer: Continue Engineering Development of AN/UYK-43 Navy Embedded Computer System (software compatible with the AN/UYK-7 computer). Continue Engineering Development of the AN/UYK-44 Militarized Reconfigurable Processor and Computer (software compatible with the AN/UYK-20 and AN/AYK-14 computers). The decrease of 2,116 between the FY 1982 and FY 1983 funding estimates is because of completion of the Engineering Development Model. X0911 Automatic Data Processing Security: Continue development of software verification techniques, to provide that a computer software program satisfies security and performance requirements. Continue development of a secure operating system, secure semi-automatic data sanitization application program, and a secure data base management system which will permit merging various

classifications of data in a secure enviornment. These fforts will result in multi-level secure systems which will share computer resources and data by users and application programs of differing classification levels. As this is a continuing program the above funding profile includes outyears escalation and encompasses all work or development phases now planned or anticipated through FY 1984.

(U) COMPARISON WITH FY 1982 PROGRAM ELEMENT DESCRIPTIVE SUMMARY: (Dollars in Thousands) Changes between the funding profile shown in the FY 1982 Descriptive Summary and this Descriptive Summary are as follows. Z1353 Tactical Embedded Computer: Increases of 1,999 (FY 1981), 3,315 (FY 1982) and 8,146 (1983) result from the decision to support dual contractor participation through the entire Engineering Development Phase of the AN/UYK-43 and AN/UYK-44 computers ("fixed and final" contractor bids were higher than anticipated), as well as escalation and inflation. X0911 Automatic Data Processing Security: Increases of 1,841 (FY 1983) and 1,050 (FY 1984) result from transfer of project to this Program Element in FY 1983. It was previously funded in PE 63526N, Advanced Computer Technology.

(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	8,999	15,314	18,664	11,717	Continuing	Continuing
Z1353	Tactical Embedded Computer	8,999	15,314	18,664	11,717	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 64574N
DoD Mission Area: 235 - Naval Warfare Support

Title: Navy Tactical Embedded Computer Program
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Z1353 Tactical Embedded Computer: The Navy's tactical computer inventory consists primarily of the AN/UYK-7 and the AN/UYK-20 computers whose hardware technology is rapidly becoming obsolete and which have limitations associated with memory addressability, performance, and maintainability. However, the Navy has a significant investment in tactical applications and support software that is not obsolete, and should be enhanced and used as new computers are employed in tactical systems during development or major upgrade. The AN/AYK-14 computer, which is software compatible with the AN/UYK-20, is now entering production as the Navy standard for airborne applications. This project develops two new computers to replace the present ones. The AN/UYK-43 will replace the AN/UYK-7 and will be used in new systems with high and medium performance requirements and will be software compatible with the AN/UYK-7 computer to allow use of the extensive base of existing support software and of operational software. The AN/UYK-44 will be software compatible with the AN/UYK-20 and AN/AYK-14 computers to allow use of the extensive base of existing support software and permit transfer of operational software. It will improve standard, state-of-the-art microprocessors and microcomputers that can be employed in a wide range of tactical applications with low and medium performance requirements. Both new computers will take advantage of the latest advancements in the field of microelectronics, computer architecture, and software engineering to provide high reliability and significantly reduced maintenance requirements in addition to increased performance and reduced size, power, and cost. X0911 Automatic Data Processing Security: Performance of the Navy's mission has become increasingly dependent upon automated systems. This project supports the development of technology to protect Navy automatic data processing systems from unauthorized disclosure, destruction, and/or modification of data, and denial of system services. Specific tasks include development of techniques for computer software security verification, a secure computer operating system, a semi-automatic data sanitization program, and a secure data base management system. these developments will allow users and data of differing classification levels to share computer resources and data base without sacrificing security.

(U) RELATED ACTIVITIES: Advanced Computer Technology (PE 63526N); World-Wide Military Command and Control System (PE 33151N, PE 33113M); Ocean Surveillance Information System (PE 24600N); Advanced Control Architectural Testbed (PE 62701N); Command and Control Technology (PE 62721N); Avionics Development (AN/AYK-14 Airborne Computer Development, PE 64203N); Acoustic Search Sensors (AN/UYS-1 Signal Processor Development, PE 64261N); Communications Security (PE 33401N); Intelligence Data Handling System (PE 31025N); Command and Control System (Adv. (PE 63717N); Shipboard Tactical Intelligence Processing (PE 25670N); Militarized Peripherals (PE 24163N).

(U) WORK PERFORMED BY: Naval Sea Systems Command, Washington, DC; Naval Electronic Systems Command, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, Dahlgren, VA; Naval Research Laboratory, Washington, DC; Naval Weapons Support Center, Crane, IN; Naval Avionics Center, Indianopolis, IN; Fleet Combat Direction System Support Activities, Dam Neck and San Diego, CA. Contractors will be selected competitively to support the planned activities.

Program Element: 64574N
DoD Mission Area: 235 - Naval Warfare Support

Title: Navy Tactical Embedded Computer Program
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Z1353 Tactical Embedded computer: Program Element was an FY 1980 new start to support accelerated Navy Tactical Embedded Computer Development in accordance with Congressional direction. Chief of Naval Operation approved the Chief of Naval Material Master Plan for Tactical Embedded Computer Resources. Awarded two parallel, individually funded contracts for the AN/UYK-43 development. Awarded two parallel, individually funded contracts for the AN/UYK-44 development. Prepared test plans and procedures; analyzed design; reviewed preliminary documentation. X0911 Automatic data processing Security: Project was a new start in FY 1980 in PE 63526N, Advanced Computer Technology. It was transferred to this PE in FY 1983. Project is based upon documented security requirements and is coordinated with other DOD agencies to avoid duplication of effort. Three tasks were initiated: (1) development of a Kernelized Secure Operating System; (2) development of a semi-automatic data sanitization program; and (3) evaluation of security features of commerically available data base anagement systems.

2. (U) FY 1982 Program: Z1353 Tactical Embedded Computer: Continue AN/UYK-43 Engineering Development. Contractors complete construction and begin testing initial Engineering Development Models. AN/UYK-44 Advanced Production Equipment delivery, continue benchmark testing and testing for environmental and Standard Electronic Module qualifications. X0911 Automatic Data Processing Security: Complete Secure Communication Microprocessor operating system and Large Scale Integrated Guard secure network; complete initial review of encrypted device authentication for identification of peripheral input/output devices connected to Automatic data processing and weapon systems. Continue development of multi-level secure systems (Advanced Command and Control Testbed Guard and Kernelized Secure Operating System and analysis of trusted data base management systems security features.

3. (U) FY 1983 Planned Program: Z1353 Tactical Embedded Computer: AN/UYK-43 Engineering Development Model delivery; continue testing; select production contractor; initiate Technical and Operational Evaluation. Complete AN/UYK-44 testing and Standard Electronic Module qualifications; commence initial production; initiate Technical and Operational Evaluation of microcomputer. The decrease of 2,116 between the FY 1982 and FY 1983 funding estimates is because of completion of the Engineering Development Model. X0911 Automatic Data Processing Security: Continue technology development and testing of Advanced Command and Control Testbed Guard, Kernelized Secure Operating System trusted data base management systems, and Device Authentication. Begin development of Risk Modeling for analysis and correlation of Automatic data procesing installaions' risk assessment data.

4. (U) FY 1984 Planned Program: Z1353 Tactical Embedded Computer: Complete Technical Evaluation and land based testing of AN/UYK-43; authorize limited production. Complete Technical and Operational Evaluation of AN/UYK-44 microcomputer; authorize full-scale production. X0911 Automatic Data Processing Security: Complete Risk Modeling, Advanced Command and Control Testbed Guard, and Kernelized Secure Operating System. Continue development of trusted data base management systems and Device Authentication. Begin development of a computer software security verification tool.

Program Element: 64574N
DoD Mission Area: 235 - Naval Warfare Support

Title: Navy Tactical Embedded Computer Program
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Z1353 Tactical Embedded Computer: Complete Operational Evaluation of AN/UYK-43 obtain Approval for Service Use. Obtain Approval for Service Use of AN/UYK-44 microcomputer. Continue to develop and implement improvements to equipment and associated software to meet operational requirements. X0911 Automatic Data Processing Security: Complete trusted data base management systems, Device Authentication, and software security verification tools.

6. (U) Milestones: Not applicable.

Project: Z1353 Title: Tactical Embedded Computer
Program Element: 64574N Title: Tactical Embedded Computer Progran
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Navy's current tactical computer inventory consists primarily of the AN/UYK-7 and AN/UYK-20 computers, whose hardware technology is rapidly becoming obsolete and which have limitations associated with memory addressability, performance, and maintainability. However, the Navy has a significant investment in tactical applications and support software that is not obsolete and should be enhanced and utilized as new computers are employed in tactical systems during development or major upgrade. The AN/AYK-14 computer, which is software compatible with the AN/UYK-20, is now entering production as the Navy standard for airborne applications. This project develops two new computers to replace the present ones. The AN/UYK-43 Navy Embedded Computer System family of standard computers will replace the AN/UYK-7 and be used in new systems with high and medium performance requirements and will be software compatible with the AN/UYK-7 computer to allow use of the extensive base of existing support software and to maximize transfer of operational software. The AN/UYK-44 Militarized Reconfigurable Processor and Computer family will be software compatible with the AN/UYK-20 and AN/AYK-14 computers to allow use of the extensive base of existing support software and to maximize transfer of operational software. It will provide standard, state-of-the-art microprocessors and microcomputers that can be employed in a wide range of tactical applications with low and medium performance requirements. Both new computers will take advantage of the latest advancements in the field of microelectronics, computer architecture, and software engineering to provide high reliability and significantly reduced maintenance requirements in addition to increased performance and reduced size, power, and cost.

(U) RELATED ACTIVITIES: Advanced Computer Technology (Program Element 63526N); World-Wide Military Command and Control System (Program Element 33151N, Program Element 33113M); Ocean Surveillance Information System (Program Element 24600N); Advanced Control architectural Testbed (Program Element 62701N); Command and Control Technology (Program Element 62721N); Avionics Development (AN/AYK-14 Airborne Computer Development, Program Element 64203N); Acoustic Search Sensors (AN/UYS-1 Signal Processor Developent, Program Element 64261N); Communications Security (Program Element 33401N); Intelligence Data Handling System (Program Element 31025N).

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, Dahlgren, VA; Naval Research Laboratory, Washington, DC; Naval Weapons Support Center, Crane, IN; Naval Avionics Center, Indianapolis, IN; Fleet Combat Direction System Support Activities, Dam Neck, VA, and San Diego, CA. Contractors: Contractors will be selected competitively to support the planned activities.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This project was an FY 1980 new start to support accelerated Navy Tactical Embedded Computer Development in accordance with Congressional direction. CNO approved the Chief of Naval Material Master Plan for Tactical Embedded Computer Resources. Awarded two parallel, individually funded contracts for the AN/UYK-43 development. Awarded two

parallel, individually funded contracts for the AN/UYK-44 development. Prepared test plans and procedures; analyzed design; reviewed preliminary documentation.

2. (U) FY 1982 Program: Continue AN/UYK-43 Engineering Development. Contractors complete construction and begin testing initial Engineering Development Models. AN/UYK-44 Advanced Production Equipment delivery; continue benchmark testing and testing for environmental and Standard Electronic Module qualifications.

3. (U) FY 1983 Planned Program: AN/UYK-43 Engineering Development Model delivery; continue testing; select production contractor; initiate Technical and Operational Evaluation. Complete AN/UYK-44 testing and Standard Electronic Module qualifications; commence initial production; initiate Technical and Operational Evaluation of microcomputer.

4. (U) FY 1984 Planned Program: Complete Technical Evaluation and land-based testing of AN/UYK-43; authorize limited production. Complete Technical and Operational Evaluation of AN/UYK-44 microcomputer; authorize full-scale production.

5. (U) Program to Completion: Complete Operational Evaluation of AN/UYK-43; obtain Approval for Service Use of AN/UYK-44 microcomputer. Continue to develop and implement improvements to equipment and associated software to meet operational 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
Z1353	Tactical Embedded Computer	17,313	21,979	19,863	12,273	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64575N
Title: AN/SQS-53C
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	35,980	22,387	TBD	TBD
S1451	AN/SQS-53C	*6,500	*14,500	35,980	22,387	TBD	TBD
	Quantity (Developmental Test and Evaluation/Operational Test and Evaluation)						(2)

*Funded under PE 63589N, Major Surface Combatant (DDGX)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The multi-phased AN/SQS-53 improvement program will modernize the AN/SQS-53 series sonars currently installed, or scheduled to be installed, in [redacted] the Navy's most modern surface ships. Phase I of this modernization, which produces the AN/SQS-53B, will improve system performance and operability through replacement of existing displays which are difficult to operate and maintain. Phase I also will permit integration of AN/SQS-53 sonar data with that of the AN/SQR-19 Tactical Towed Array Sonar and Light Airborne Multi-Purpose System MK III in the Anti-Submarine Warfare Control Systems [redacted] Phase II of this effort, which produces the AN/SQS-53C, was initiated in March 1980 when the Secretary of the Navy approved the Phase I Navy Decision coordinating Paper (NDCP). Phase II will update the mid-1960's technology of the sonar through use of Standard Electronic Modules (SEMs) and Navy standard digital building blocks to provide improved active sonar performance; permit future growth; and reduce space, weight, maintenance time, and supply/logistic requirements. The major thrust of the performance improvement is to the active (echo ranging) sonar capability which is required to counter the [redacted] threats. A figure of merit increase [redacted] is predicted.

(U) BASIS FOR FY 1983 RDT&E REQUEST: A Department of the Navy Systems Acquisition Review Council decision is the basis for establishing the AN/SQS-53C sonar as a separate project. The FY 1983 program will fund the continuation of full scale engineering development including the acquisition of all government furnished equipment and other material procurement. In addition, computer software coding will begin. The above funding profile includes outyear escalation [illegible] encompases 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 (shown in Program Element 63589N), as modified by FY 1982 Budget Amendment, and this Descriptive Summary are as follows: an increase of 6,500 in FY 1981 was received from DDGX Combat System, Project S1337; a decrease of 25,500 in FY

Program Element: 64575N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: AN/SQS-53C
Budget Activity: 4 - Tactical Programs

1982 due to Congressional reduction; an increase of $31,589 in FY 1983 due to program restructuring to accomodate earlier loss of funds.

(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	0	0	*40,000	4,400	TBD	TBD
S1451	Lightweight Sonar	0	0	*40,000	4,400	TBD	TBD

* Added by FY 1982 Department of Defense Budget Amendment.

(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	0	0	0	0	2,044,886	2,044,886
Quantity	(0)	(0)	(0)	(0)	(61)	(61)
SCN (Starts with DDG-54, FY 1988 Funding)	0	0	0	0	3,175,266	3,175,266
Quantity	(0)	(0)	(0)	(0)	(72)	(72)

Program Element: 64575N
Title: Anti-Submarine Warfare Combat System Integration
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The AN/SQS-53 series sonar is being improved in several phases because it will be the principal anti-submarine warfare sensor for [ ] the Navy's most modern surface 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. The current AN/SQS-53 sonar is, in effect, an AN/SQS-26(CX) sonar with a modified digital fire control interface, and it incorporates outmoded electronic technology dating from the early 1960's. By current standards, the AN/SQS-53 sonar system is deficient in performance under adverse 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 direction systems or new acoustic sensor and weapon control systems under development.

(U) Phase II of the program develops major preplanned product improvements to AN/SQS-53B sonars and results in a significant increase in all Carrier Battle Group escort active sonar Figures of Merit. These improvements are necessary to counter the [ ] threat; [ ] They will be backfit [ ] The Defense Appropriations Act for FY 1982 reduced program funding by $25.5M. This has resulted in delaying the AN/SQS-53C [ ] The restructured program shown represents the most expeditious fleet introduction possible given no additional funding in FY 1982 or FY 1983. The approach to be taken will be to retain the AN/SQS-53B passive features and integrate them with the AN/SQS-53C active sonar and reliability features.

(U) The AN/SQS-53C will update the mid-1960's technology of the sonar through use of Standard Electronic Modules (SEM) and Navy standard building blocks to provide improved sonar performance; permit future growth; and reduce space, weight, maintenance time, and supply logistic requirements. Phase II includes modification of the power supplies and transmitter subsystem and redesign of the receiver subsystem for improved performance gains. The improvements are scheduled for the Phase I ships [ ] The active sonar improvements will be designed so that the preceding Phase I improvements can become an integrated part of Phase II. Two engineering development models will be fabricated; one will be used for land based testing and one will be used for testing [ ] To minimize Phase I/Phase II transition/fleet introduction costs and to deliver the required performance earlier, pilot production is being considered with production funding commitments keyed to declining risk as engineering development progresses.

(U) RELATED ACTIVITIES: PE 25623N, Project S0217, Surface Ship Sonar Modernization Program - Development of Phase I improvements (AN/SQS-53B). PE 64518N, Project S0251, CIC Conversion/Data display System - Development of standa ' surface ship data display consoles. PE 64212N, Project W0274, Light Airborne Multi-Purpose System MK III - Development of Ant Submarine Warfare helicopter for deployment from surface ships. PE 64713N, Project S0234, Tactical Towed Array sonar - Development of towed array sonars for

surface ship tactical use. PE 25620N, Project S0896, Anti-Submarine Warfare combat system Integration - Development of fully integrated anti-submarine warfare control system for coordinated employment of anti-submarine warfare sensor, fire control, and acoustic warfare systems. PE 63589N, Major Surface Combatant (DDGX) - funded initial start of AN/SQS-53 Phase II in FY 1981 and 1982; funding to complete Phase II was transferred from PE 25623N and PE 63589N to clarify program identification to this Program Element.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, DC; Naval Underwater Systems Center, New London Laboratory, New London, CT; Naval Ocean Systems Center, San Diego, CA; Naval Sea Systems Detachment, Norfolk, VA (In-Service Engineering Agent). Contractors: General Electric Company, Syracuse, NY; Hughes Aircraft Company, Fullerton, CA; Sperry-Univac, St. Paul MN; Quest Research Corp., McLean, VA; and others yet to be competitively selected.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Under PE 25623N, Phase I of the AN/SQS-53 Improvement Program entered full scale development in FY 1979 for the design and development of a modern control and display subsystem. Baseline performance improvements, passive equipment cabinet, [redacted] and various minor changes had been previously developed and placed in production. Hardware design and fabrication of two Engineering Development Control and Display Subsystems were completed. Phase II was initiated with the commencement of detailed design definition and full scale development planning. Special tests were run which demonstrate full transportability of the software to the new Navy standard UYK-44 computers. Detailed planning for ship installation and technical and operational evaluation of the development model was completed.

2. (U) FY 1982 Planned Program: Commence detailed subsystem design and specifications; critical item developmental government furnished equipment will be procured for the two engineering development models of the improved sonar.

3. (U) FY 1983 Planned Program: Will include procurement of the remaining government furnished equipment and contractor furnished material and software coding will be initiated.

4. (U) FY 1984 Planned Program: Government furnished equipment will be delivered and initial software te ing will begin. System assembly and integration will commence.

5. (U) Program to Completion: Land based testing and initial operational testing and evaluation are scheduled to be completed in

Program Element: 64575N
DoD Mission Area: 233 - Anti-Submarine Warfare

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

6. (U) Milestones:

Milestones	Date
1. Engineering Development Commenced	3 September 1981
2. Production Decision	December 1987

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64576N
DoD Mission Area: 234-Mine Warfare
Title: Influence 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	*	*	5,820	12,709	49,671	68,200
S1670	Hydrofoil Pressure/Acoustic/Magnetic Sweep System	*	*	1,025	0	0	1,025
S1677	Explosion Resistant Multi-Influence Sweep System	*	*	4,795	12,709	49,671	67,175

* FY 1981 and FY 1982 work conducted under Program Element 63502N, Project S0262, Influence Mine Countermeasures (formerly Pressure/Acoustic/Magnetic Minesweeping).

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The United States Navy Two systems will be developed. The Hydrofoil Pressure/Acoustic/Magnetic Sweep System consists of acoustic and magnetic signature generating equipment mounted on a PHM class hydrofoil. When combined with the pressure signature of the PHM, this equipment will give the U.S. Navy a major improvement in current minesweeping capabilities. This system is planned to be operational The Explosion Resistant Multi-Influence Sweep System is a cooperative development effort under the aegis of NATO Naval Armaments Group, Project Group 14 with design, engineering testing and costs divided equally among five participating nations. This system is a special design, soft hulled ship capable of withstanding mine explosions which has on-board equipment for generating the acoustic/magnetic influences necessary to detonate influence sea mines. The Explosion Resistant Multi-Influence Sweep System is planned to be fully operational

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S1670, Hydrofoil Pressure/Acoustic/Magnetic Sweep System. Complete engineering development models and prepare for technical and operational evaluations. Project S1677, Explosion Resistant Multi-Influence Sweep System. (1) Complete negotiations and obtain United States approval for Memorandum of Understanding (MOU) Phase III (Engineering Development). (2) Continue support to NATO Explosion Resistant Multi-Influence Sweep System Program Office, Koblenz, Germany, (3) Continue participation in NATO Project Group 14 (4) Monitor Explosion Resistant Multi-Influence Sweep System contracts awarded to US industry, (5) Explosion Resistant Multi-Influence Sweep System Program Office will develop specifications for the Engineering Development Contracts. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 64576N
DoD Mission Area: 234-Mine Warfare

Title: Influence Mine Countermeasures
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 for this development (under Program Element 63502N, Surface Mine Countermeasures, Project S0262, Pressure/Acoustic/Magnetic Minesweeping System) and that shown in this Descriptive Summary reflect a program decrease of 6,029 in the Hydrofoil Pressure/Acoustic/Magnetic Sweep Project in FY 1983 and zero funding in the outyears. This reduction was brought about by a tentative Navy decision to defer a decision to fund full scale engineering development of the Hydrofoil Pressure/Acoustic/Magnetic Minesweeping development until a determination can be made regarding the cost of continued U.S. participation in development of the NATO Explosion Resistant Multi-Influence Sweep System. As a result of the transition of this effort from advanced development to engineering development Program Element 63502N, Surface Mine Countermeasures; Project S0262, Influence Mine Countermeasures changes to Program Element 64576N, Influence Mine Countermeasures which includes Project S1677, Explosion Resistant Multi-Influence Sweep System and Project S1670, Hydrofoil, Pressure/Acoustic/Magnetic Sweep System.

(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	2,061	3,986	8,454	11,849	Continuing	Continuing
*S0262	Pressure/Acoustic/Magnetic Minesweeping System	2,061	3,986	8,454	11,849	Continuing	Continuing

*Note: During FY 1980, FY 1981, and FY 1982: This project was under Program Element 63502N, Surface Mine Countermeasures; Project S0262, Influence Mine Countermeasures (formerly Pressure/Acoustic/Magnetic Minesweeping).

Program Element: 64576N
DoD Mission Area: 234 - Mine Warfare

Title: Influence Mine Countermeasures
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The United States Navy [illegible] Two systems have been proposed. The Hydrofoil Pressure/Acoustic/Magnetic Sweep System consists of acoustic and magnetic signature generating equipment mounted on a PHM class hydrofoil with the foils providing the pressure signature. This system will give the U.S. Navy [illegible] a major improvement in current minesweeping capabilities. This system is planned to be operational [illegible] 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, engineering 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 [illegible]

(U) RELATED ACTIVITIES: Program Element 63502N, Surface Mine Countermeasures; Project S0262, Influence Mine countermeasures.

(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 high-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) Developed procurement documentation 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 with four other participating nations; France, Germany, Netherlands and the United Kingdom for Phase I (feasibility study) and Phase II (common research). (2) Completed selection and preliminary design of propulsion system. (3) Completed working draft of Memorandum of Understanding for Phase III, Engineering Development and started technical negotiations. (4) Provided assistant program manager and other required expertise to Explosive Resistant Multi-Influence Sweep System Program Office (Koblenz, Germany). (5) Award contracts for [illegible] products study, underwater explosion testing, a mine/ship interaction study, a surface phenomenon effects study, [illegible]

Program Element: 64576N
DoD Mission Area: 234 - Mine Warfare

Title: Influence Mine Countermeasures
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 power source. (3) Select acoustic power source. (4) Award contract for three (3) engineering development models. (5) Award contract for station keeping and speed/depth control. (6) Procure high speed magnetic cable. Explosion Resistant Multi-Influence Sweep System - (1) Complete negotiations and obtain United States approval for Memorandum of Understanding for Phase III engineering development. (2) Continue support to Explosion Resistant Multi-Influence Sweep System Program Office (Koblenz, Germany). (3) Continue to participate in NATO Naval Armaments Group Project Group 14.

3. (U) FY 1983 Planned Program: Hydrofoil Pressure/Acoustic/Magnetic Sweep System - (1) Prepare for technical and operational evaluation of Hydrofoil Pressure/Acoustic/Magnetic Sweep System. (2) Procure high speed acoustic sweep equipment. (3) Complete interface with PHM. (4) Complete ship alteration for installing Hydrofoil Pressure/Acoustic/Magnetic Sweep System on PHM. Explosion Resistant Multi-Influence Sweep System - (1) Continue support to Program Office (Koblenz, Germany). (2) Continue participation in NATO Project Group 14. (3) Provide U.S. expertise and U.S. financial support to assure success of engineering development phase. (4) Program office will develop specification for engineering development contracts.

4. (U) FY 1984 Planned Program: Hydrofoil Pressure/Acoustic/Magnetic Sweep System - (1) Project is not funded in FY 1984. Explosion Resistant Multi-Influence Sweep System - (1) Continue support to Explosion Resistant Multi-Influence Sweep System Program Office (Koblenz, Germany). (2) Continue participation in NATO Project Group 14. (3) Program office will award engineering development contracts.

5. (U) Program to Completion: Explosion Resistant Multi-Influence Sweep System - (1) Continue support to Explosion Resistant Multi-Influence Sweep System Program Office (Koblenz, Germany). (2) Continue participation in NATO Naval Armaments Group Project Group 14. (3) Fabricate and develop prototype Explosion Resistant Multi-Influence Sweep System. (4) Conduct [illegible] (6) Negotiate and obtain United States approval for Memorandum of Understanding for Phase IV (production) and Phase V (support). (7) Procure 12 Explosion Resistant Multi-Influence Sweep Systems for the United States.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (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	7,415	6,916	12,712	10,464	Continuing	Continuing
S0272	QUICKSTRIKE	7,415	6,916	9,727	7,466	Continuing	Continuing
S1667	Submarine Launched Mobile Mine	*	*	2,985	2,998	Continuing	Continuing
	QUICKSTRIKE Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(272)
	Submarine Launched Mobile Mine Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(83)

*Submarine Launched Mobile Mine development funded under S0272 in FY 1982 and prior years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for development of bottom mines to counter surface ships and submarines in support of the Navy's sea control mission. The program consists of the development of four target detecting devices: magnetic-seismic Target Detecting Devices MK 57/70 and [redacted] Target Detecting Devices MK 58/71. These target detecting devices will be used in MK 80 series general purpose bombs and in the new development MK 65 Mine which comprise QUICKSTRIKE series mines. The Target Detecting Device MK 58 and Firing Mechanism MK 42 are being used [redacted] to the MK 67 Submarine Launched Mobile Mine.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0272, QUICKSTRIKE - Complete technical evaluation of MK 65 Mod 2 Mine equipped with Target Detecting Device MK 70 and its associated safing and arming device MK 83 bombs to MK 63 Mod 0 Mines equipped with Target Detecting Device MK 57. Conduct operational evaluation of the MK 65 Mod 1 Mine equipped with Target Detecting Device MK 58. Continue engineering development of the MK 62, 63 and 64 Mines with Target Detecting Device MK 70 and its associated safing and arming device, and a [redacted] delivery capability for the MK 65 Mine. Project S1667, Submarine Launched Mobile Mine - Complete technical evaluation of MK 67 Mod 1 Mine with Target Detecting Device MK 58. Conduct engineering development of MK 67 Mine with dual warhead configuration; start technical evaluation. Begin upgradng of MK 67 Mine navigation system.

Program Element: 64601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (Engineering)
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 consist of the following: Project S0276, QUICKSTRIKE FY 1981 funding increased by 118 to fund increased testing of the Submarine Launched Mobile Mine, FY 1982 funding was reduced 211 due to a reduction of inflation indices. FY 1983 funding will be increased by 4,444 due to the transition of the development of Target Detecting Devices MK 70/71 and their associated safety and arming devices from advanced development under Program Element 63601N, Mine Development (Advanced) to Project S0276, QUICKSTRIKE. Similarly, the total cost to complete the QUICKSTRIKE program will increase by an estimated 21,656, due to the transiting of development of Target Detecting Device 70/71 and associated safety and arming devices to this project from advanced development. Project S167, Submarine Launched Mobile Mine: Continued development of the MK 67 Submarine Launched Mobile Mine under this project increases funding by 2,985 in FY 1983. This project will deelop multiple warheads, improved navigation and maintainability engineering improvements. This effort will result in an increase of 19,202 in total estimated cost to complete development of the MK 67 Mine.

(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	9,513	7,297	7,127	5,283	4,187	82,514
S0272	QUICKSTRIKE	9,513	7,297	7,127	5,283	4,187	82,514
	QUICKSTRIKE Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(272)
	Submarine Launched Mobile Mine Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(83)

Program Element: 64601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (Engineering)
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1934 Estimate	Additional to Completion*	Total Estimated Cost *
OPN	PE 24304 Line Item 335525	9,559	21,185	33,289	46,052	174,933	291,067
Quantity	QUICKSTRIKE MK 65	(51)	(307)	(579)	(660)	(1,460)	(3,057)
	Target Detecting Device MK 57	(1,701)	(1,588)	(1,595)	(1,758)	(350)	(7,503)
	Target Detecting Device MK 58	0	0	0	400	(2,100)	(2,500)
	Target Detecting Device MK 70 and 71	0	0	0	0	(2,400)	(2,400)
WPN	PE 24304N Line Item 303211	0	11,100	22,300	25,900	17,800	77,100
Quantity	MK 67 Submarine Launched Mobile Mine	0	(146)	(340)	(358)	(218)	(1,062)

*Through FY 1987

Program Element: 64601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for development of shallow water bottom mines to counter surface ships and submarines in support of the Navy's sea control mission. The present stockpile of bottom mines provides some capability against surface ships in water depths and against submarines at shorter ranges. However, existing MK 52 and 55 (bottom) Mines have limited capability against the higher speed and quieter submarine targets of today. Maintenance of these mines is becoming progressively more difficult and expensive because of their obsolete technology and reliance on batteries that require refrigerated storage. Additionally, some of the DESTRUCTOR mine designs were compromised during the mining campaign in Vietnam. Quantities of mines now in the stockpile are

QUICKSTRIKE Mines are a family of modern bottom mines that will be simple and inexpensive to maintain, capable of rapid preparation for use and once laid will provide the target response, countermeasures resistance and in-water life required to fulfill existing operational needs. This program involves the development in four Target Detecting Devices for use in the QUICKSTRIKE mines: Target Detecting Devices MK 57/70 will react to target signatures and Target Detecting Devices MK 58/71 will react to target signatures. These mechanisms coupled with associated safing and arming devices and flight gear will adapt 500 pound, 1,000 pound, and 2,000 pound MK 80 series bombs to mines and will be the firing mechanism of a new development 2,000 pound MK 65 Mine. These mines will be capable of delivery from a wide variety of aircraft The Target Detecting Device MK 58 and the in-service DESTRUCTOR Firing Mechanism MK 42 will also be used to convert a stand-off MK 67 Submarine Launched Mobile Mine. The Submarine Launched Mobile Mine will provide the Navy a clandestine mine delivery capability for high threat areas which does not exist today.

(U) RELATED ACTIVITIES: Program Element 63601N, Mine Development (Advanced Development).

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, White Oak, Silver Spring, MD (lead laboratory); Naval Mine Engineering Facility, Yorktown, VA; Naval Undersea Warfare Engineering Station, Keyport, WA; Naval Underwater Systems Center, Newport, RI; Naval Weapons Handling Laboratory, Earle, NJ. Contractors: Aerojet General Manufacturing, Fullerton, CA; P.R. Mallory, Tarrytown, NY; Catalyst Research Corporation, Baltimore, MD; Burroughs Corporation, Paoli, PA; Westinghouse Corporation, Baltimore, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed advanced development of QUICKSTRIKE series mines and Submarine Launched Mobile Mine. All necessary advanced development testing has been completed and the results indicate that the proposed systems are ready for full scale development. Obtained Provisional Approval for Service Use for Submarine Launched Mobile Mine with the in-service Firing Mechanism MK 42; conducted additional reliability and accuracy tests of the Submarine Launched Mobile Mine and obtained Provisional Approval for Service Use. Completed QUICKSTRIKE technical/operational evaluation of the Target Detecting Device MK 57 in MK 62 Mod 0 Mine (500 pound MK 82 Bomb) and 2,200 pound MK 65 Mod 0 Mine. Obtained Approval for

Program Element: 64601N
DoD Mission Area: 234 - Mine Warfare

Title: Mine Development (Engineering)
Budget Activity: 4 - Tactical Programs

Service Use of the Target Detecting Device MK 57 in the MK 62 Mod 0 Mine and MK 65 Mod 0 Mine and initiated procurement. Continued engineering development of the MK 63 Mod 0 QUICKSTRIKE Mine (1,000 lb MK 83 Bomb with Target Detecting Device MK 57) and MK 64 Mod 0 QUICKSTRIKE Mine (2,000 lb MK 84 Bomb with Target Detecting Device MK 57). Initiated development of a retardation system to permit [ ] delivery of the MK 65 mine. Started development of a new safing and arming device to permit [ ] aircraft delivery of MK 62,63 and 64 QUICKSTRIKE Mines.

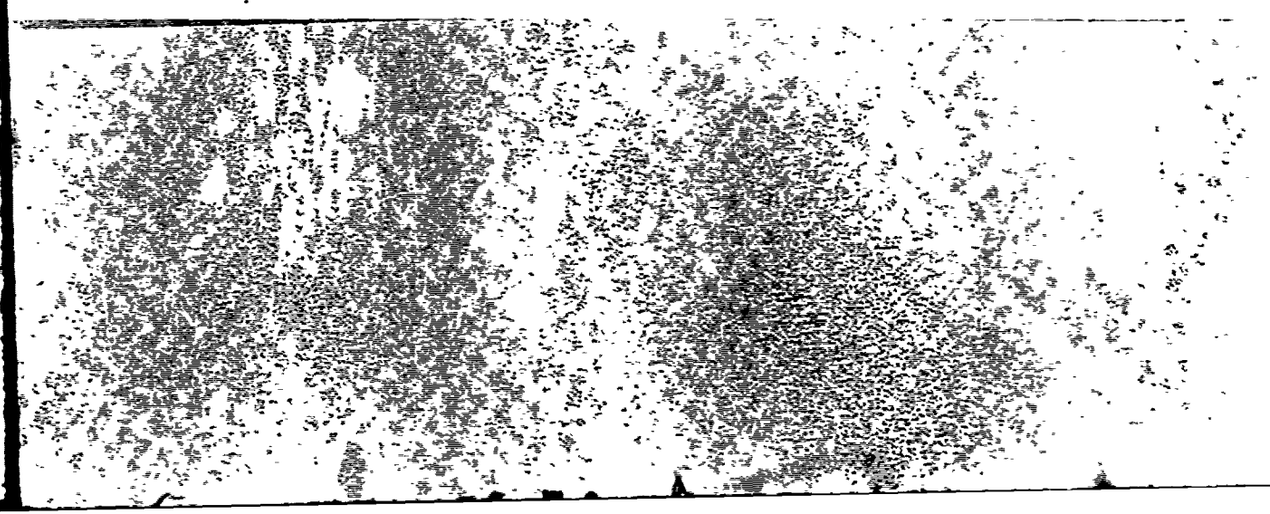
2. (U) FY 1982 Program: Complete technical evaluation of the MK 64 Mod 0 Mine. Complete technical evaluation of the Target Detecting Device MK 58 in the Mine MK 65 Mod 1. Continue development of [ ] safing and arming device. Complete reliability and accuracy tests of MK 67 Mod 0 Submarine Launched Mobile Mine with Firing Mechanism MK 42; obtain approval for service use. Complete development of MK 67 Submarine Launched Mobile Mine exercise and training versions.

3. (U) FY 1983 Planned Program: QUICKSTRIKE: Transfer development of Target Detecting Devices MK 70/71 from Program Element 63601N; Mine Development (Advanced). Complete technical/operational evaluation of the QUICKSTRIKE Mine MK 63 Mod 0 including [ ] systems, MK 65 Mod 2 Mine (with Target Detecting Device MK 70) and MK 65 Mod 1 Mine (with Target Detecting Device MK 58); obtain approval for service use. Continue development of Mines MK 62, 63 and 64 with Target Detecting Device MK 70, a new safing and arming device and a [ ] system for the MK 65 Mine. MK 67 Submarine Launched Mobile Mine: Complete technical evaluation of the MK 67 Mod 1 Mine with Target Detecting Device MK 58; conduct engineering tests of dual warhead configuration and start evaluation of improved navigation system components.

4. (U) FY 1984 Planned Program: QUICKSTRIKE: complete technical evaluation of MK 65 Mine with [ ] system and operational evaluation of MK 65 Mod 2 Mine with Target Detecting Device MK 70. Conduct technical evaluation of Target Detecting Devices MK 70/71 and new safing and arming device in the QUICKSTRIKE Mines MK 62 63, 64 and 65. MK 67 Submarine Launched Mobile Mine: Obtain Approval for Service Use with Target Detecting Device MK 58; complete technical evaluation of dual warhead and conduct operational evaluation.

5. (U) Program to Completion: QUICKSTRIKE: Complete operational evaluation of Target Detecting Devices MK 70/71 and new safing and arming device in QUICKSTRIKE MK 62, 63, 64 and 65 Mines. Complete development of test sets for QUICKSTRIKE Mines and complete procurement and training documentation for all systems. MK 67 Submarine Launched Mobile Mine: Develop and test improvements to update Submarine Launched Mobile Mine component reliability and navigational accuracy; obtain Approval for Service Use of dual warhead configuration.

6. (U) Milestones: Not applicable.



Project: S0272
Program Element: 64601N
DoD Mission Area: 234 - Mine Warfare

Title: QUICKSTRIKE
Title: Mine Development (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project will develop shallow water bottom mines to counter surface ships and submarines in support of the Navy's sea control mission. The present stockpile of bottom mines which provide some effectiveness capability in water depths down to [ ] were designed 10-30 years ago. MK 52/55 series mines were designed primarily as anti-submarine warfare mines and the DESTRUCTORS as anti-waterborne logistic craft mines. MK 52 and 55 Mines have limited capability against the higher speed and quieter submarine targets of today. [ ] It is becoming progressively more difficult and expensive to maintain these mines because of their obsolete technology and reliance on batteries that require refrigerated storage. Some of the DESTRUCTOR mine designs were compromised during the mining campaign in Vietnam. Quantities of mines now in the stockpile are [ ] The QUICKSTRIKE Mines are a family of new development bottom mines that will provide the target response, countermeasures resistance and readiness required to fulfill existing operational needs. This program involves the development of four Target Detecting Devices for use in the QUICKSTRIKE mines. Target Detecting Devices MK 57/70 will react to [ ] target signatures and Target Detecting Devices MK 58/71 will react to [ ] target signatures. These mechanisms coupled with associated safing and arming devices, will be adapted to 500 pound, 1,000 pound, and 2,000 pound MK 80 series bombs and a new development 2,000 pound MK 65 Mine and will be capable of delivery from a wide variety of aircraft.

(U) RELATED ACTIVITIES: Program Element 63601N, Mine Development (Advanced Development); Program Element 64601N, Project S1667, Submarine Launched Mobile Mine.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, White Oak, Silver Spring, MD (lead laboratory); Naval Mine Engineering Facility, Yorktown, VA; Naval Weapons Handling Laboratory, Earle, NJ. Contractors: Aerojet General Manufacturing, Fullerton, CA; P.R. Mallory, Tarrytown, NY; Catalyst Research Corporation, Baltimore, MD; Burroughs Corporation, Paoli, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed advanced development of QUICKSTRIKE series mines. All necessary advanced development testing has been completed and the results indicate that the proposed systems are ready for full scale development. Completed QUICKSTRIKE technical/operational evaluation of the [ ] Target Detecting Device MK 57 in MK 62 Mod 0 Mine (500 pound MK 82 Bomb) and new 2,000 pound MK 65 Mod 0 Mine. Obtained Approval for Service Use of the Target Detecting Device MK 57 in the MK 62 Mod 0 Mine and MK 65 Mod 0 Mine and initiated procurement. Continued engineering development of the MK 63 Mod 0 QUICKSTRIKE Mine (1,000 lb MK 83 Bomb with Target Detecting Device MK 57) and MK 64 Mod 0 QUICKSTRIKE Mine (2,000 lb MK 84 Bomb with Target Detecting Device MK 57). Initiated development of a retardation system to permit [ ] delivery of the MK 65 mine. Started development of a new safing and arming device to permit aircraft delivery of MK 62,63 and 64 QUICKSTRIKE Mines.

Project: S0272 — Title: QUICKSTRIKE
Program Element: 64601N — Title: Mine Development (Engineering)
DoD Mission Area: 234 - Mine Warfare — Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Complete technical evaluation of the MK 64 Mod 0 Mine. Complete technical evaluation of the Target Detecting Device MK 58 and the Mine MK 65 Mod 1. Continue development of [redacted] safing and arming device.

3. (U) FY 1983 Planned Program: Complete technical/operational evaluation of the QUICKSTRIKE MK 63/64 Mod 0, including [redacted] system, MK 65 Mod 2 (with Target Detecting Device MK 70) and MK 65 Mod 1 (with Target Detecting Device MK 58); obtain Approval for Service Use. Transfer development of Target Detecting Devices MK 70/71 from Program Element 63601N, Mine Development (Advanced). Continue engineering development of Mines MK 62, 63 and 64 with Target Detecting Device MK 70/71 and new safing and arming device and engineering development of [redacted] capability for mine MK 65. Update procurement and training documentation for all additional funding in FY 1983 is for increased effort of [redacted] capability for the Mine MK 65 system.

4. (U) FY 1984 Planned Program: Complete technical evaluation of MK 65 Mine with [redacted] operational evaluation of MK 65 Mod 2 Mine. Conduct technical evaluation of Target Detecting Devices MK 70/71 and new safing and arming device in the QUICKSTRIKE Mines MK 62 63, 64 and 65.

5. (U) Program to Completion: Complete operational evaluation of Target Detecting Devices MK 70/71 and new safing and arming device in the QUICKSTRIKE mines MK 62, 63, 64 and 65. Complete design/documentation changes resulting from operational evaluation and develop and test improvements. Complete development of test sets and complete procurement and training documentation for all systems.

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
S0272	QUICKSTRIKE	7,415	6,916	9,727	7,466	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64602N
Title: Gun Ammunition Improvement
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	11,545	2,841	755	1,182	Continuing	Continuing
S1005	5" Ammunition Improvement	2,282	0	0	0	Continuing	Continuing
S1046	5" Guided Projectile System Integration	9,263	2,841	755	1,182	15,818	44,631

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element encompasses Engineering Development of improved 5-Inch conventional gun ammunition, Submunition Projectile, an Improved 5-Inch Illumination Projectile, and integration of terminally guided projectiles into ship systems. Overall ballistic ammunition improvement efforts are designed to enhance projectile lethality and effectiveness against surface point and area targets by providing more lethal conventional ballistic ammunition and an illumination range capability equivalent to all 5" high explosive rounds.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Guided Projectile Integration Project will fund Follow on Test and Evaluation for captive carry demonstrations aboard USS BRISCOE (DD-977) as required by Commander Operational Test and Evaluation Force, and evaluation of new designs developed under related (Army and Navy) hardware. 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: S1005, 5" Ammunition Improvement: A reduction of 626 in FY 1981 due to a reprogramming and changes in escalation rates. Project S1046 5" Guided Projectile Integration: an addition of 170 in FY 1981, and reductions of 111 in FY 1982, and 61 in FY 1983 as a result of minor reprogramming actions and refinements of costs.

Program Element: 64602N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Gun Ammunition Improvement
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	4,523	12,001	2,952	816	Continuing	Continuing
S1005	5" Ammunition Improvement	0	2,908	0	0	Continuing	Continuing
S1046	5" Guided Projectile System Integration	4,523	9,093	2,952	816	11,253	38,886

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: 64602N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Gun Ammunition Improvement
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: S1005, 5" Ammunition Improvement. A low cost cargo projectile, capable of dispensing an illumination load at long ranges, will be developed with growth potential to include submunitions and other loads. Program also provides for a follow-on development of a submunitions load and electronic time fuze capable of accurately dispensing the load. S1046, 5-Inch Guided Projectile System Integration: The rapidly increasing threat to ships by high speed cruise missiles, the need to provide accurate naval gunfire against targets ashore and to reduce ammunition expenditures necessitate that the "Smart Ordnance" concept be applied to gun fired projectiles through the incorporation of terminal homing techniques. The unique features of Naval Gunfire (accurate pointing and high initial velocity) obviate the necessity for initial and mid-course guidance. The 5-Inch Guided Projectile will be compatible with existing 5"/54 gun mounts and gun fire control systems, and will provide first round accuracy against fixed and moving hard point targets. The 5-Inch Guided Projectile is comprised of a seeker, warhead, control and rocket motor sections. It is canard controlled and fin stablized in a slowly rolling airframe. Under development are both Infrared and Semi-Active Laser seekers for use with a common control system, warhead, fuze, and flight vehicle with rocket assist. A potential of up to 154 ships with 242 5" barrels could be provided with Guided Projectile capability to improve significantly the single shot kill probability against air targets and provide first round accuracy against surface targets (land and sea). The design goal is a [redacted] Circular Error Probable at ranges of [redacted] yards in the Anti-Ship Missile Defense role and to [redacted] in the surface role. The 5-Inch Guided Projectile is 61 inches long, weighs 104 pounds, and delivers a 34 pound [redacted] In FY 1977 and later years, 105 SAL and 20 Infrared projectiles were procured (using RDT&E,N funds) for development tests and Technical and Operational Evaluation. However, the 5-Inch Infrared program was deleted from the budget as a separate entity in FY 1981 and thereafter. Funding for the SAL program was cut in half by Congress in the FY 1980 appropriation and the program was restructured to accommodate the reduced funding level. During FY 1979 (and thereafter), the Navy Guided Projectile Program was restructured (in response to the formation of a Joint Army/Navy Guided Projectile Project) and 5-Inch Guided Projectile was funded under a variety of new Program Elements: PE 63609N, Surface Launched Munitions, Project S1044, 5-Inch Infrared Guided Projectile and PE 64608N, Joint Army/Navy Semi-Active Laser Guided Projectile Engineering Development, Project S0305, 5-Inch Semi-Active Laser Guided Projectile. The 5-Inch Guided Projectile System Integration effort which integrates the Guided Projectile with shipboard gun and fire control systems and associated test and evaluation is retained in this project.

(U) RELATED ACTIVITIES: Hardware to be tested under this project was produced under PE 63609N, Project S1044, 5-Inch Infrared Guided Projectile, PE 64608N, Project S0305, 5-Inch Semi-Active Laser Guided Projectile. This project is related to PE 64607N, Project S0301, Fire Control Electro Optics, PE 64652N, Gun System Improvement Program, PE 64606M, USMC Laser Homing Ordnance; and PE 64612A, Army 155mm Anti-Tank Cannon Launched Guided Projectile.

(U) WORKED PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA provides technical support for all Guided Projectiles. Other supporting activities for Guided Projectile include: Naval Weapons Center, China Lake, CA;

Program Element: 64602N
DoD Mission Area: 232 - Amphibious, Strike, Anti-Surface Warfare

Title: Gun Ammunition Improvement
Budget Activity: 4 - Tactical Program

Naval Avionics Facility, Indianapolis, IN; Naval Ordnance Station, Indian Head, MD. Contractors: Martin Marietta, Orlando, FL, is a Prime Contractor for the Joint Army/Navy Guided Projectile Program. Chandler Evans of Hartford, CT, supplies control systems for Guided Projectiles.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S1005, 5" Ammunition Improvement: Initiate Engineering Development of 5" Ballistic Cargo Projectile and illumination load. Commence analysis of submunitions alternatives. S1046, 5" Guided Projectile System Integration: The 5-Inch Guided Projectile was placed in Advanced Development in FY 1973 in PE 63301N, Long Range Surface Weapons Systems. Both seekers (Semi-Active Laser and Infrared) for the 5-Inch Guided Projectile were designed, fabricated, and gun tested for survivability and functional response. Five-inch rocket motor, fuze, and warhead designs were initiated. Commander, Operational Test and Evaluation Force established detailed test plans and procedures for Advanced Development and Engineering Development. Thirty-eight integration tests and Advanced Development prototype firings (Semi-Active Laser and Infrared systems), demonstrated basic design performance against various targets. Test firings successfully demonstrated effectiveness of the Guided Projectile concepts. The Semi-Active Laser version was successfully demonstrated against fixed and moving hard point shore targets and waterborne surface targets, entering Engineering Development in FY 1977. The Infrared version successfully engaged the high speed Ballistic Aerial Target in an over-water engagement at the Naval Surface Weapons Center, Dahlgren Laboratory, test range. A prime contractor, Martin Marietta, was established under the Joint Project Office. 5-Inch Semi-Active Laser round fabrication for Engineering Development tests are being funded under PE 64608N. Technical and Operational test and evaluation have been successfully completed and Provisional Approval for Service Use has been obtained.

2. (U) FY 1982 Program: S1005, 5" Ammunition Improvement: Not funded in FY 1982. S1046, Guided Projectile System Integration: Conduct Follow-on Test and Evaluation for captive carry demonstrations aboard USS BRISCOE (DD 977) required by Commander, Operational Test and Evaluation Force. Complete test firings of Infrared version at White Sands Missile Range, White Sands, NM.

3. (U) FY 1983 Planned Program: S1005, 5" Ammunition Improvement: Not funded in FY 1983. S1046, 5" Guided Projectile System Integration. Initiate testing of advanced guided projectile hardware fabricated or procured under PE 64608N Joint Army/Navy Semi-Active Laser Guided Projectile Engineering including new penetrating warhead, propellant change and counter-countermeasures designs.

4. (U) FY 1984 Planned Program: S1005, 5" Ammunition Improvement. Not funded in FY 1984. S1046, 5" Guided Projectile System Integration: Continue testing new guided projectile seeker, processors, warhead and propellant change designs.

5. (U) Program to Completion: S1005, 5" Ammunition Improvement: Complete analysis of submunition alternatives. Complete development of improved illumination round and electronic time fuze. Obtain Approval for Service Use of the improved illumination

projectile. Incorporate follow-on loads in the cargo projectile as determined by Operational Requirements. S1046, 5" Guided Projectile System Integration: Complete integration and test and evaluation of improved Guided Projectile designs.

6. (U) Milestones: Not applicable.

Milestones/Semi-Active Laser Guided Projectile

1. (U) DSARC II Release to Engineering Development		November 1977
2. (U) Developmental Test/Operational Test II Complete	(July 1981)*	August 1981
3. (U) DSARC III Release to Production	(September 1981)*	October 1981
4. (U) Initial Operational Capability		

* Date shown in FY 1982 Program Element Descriptive Summary.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64603N
Title: Unguided Conventional Air Launched Weapons
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	15,116	22,249	7,978	1,946	4,909	113,790
W0530	GATOR	1,999	400	0	0	0	14,232
	Quantity (Operational Test and Evaluation)				(32)		
W0636	Fuel Air Explosive Weapon II	2,458	929	1,199	0	0	48,098
	Quantity (Operational Test and Evaluation)				(60)		
W1051	Bomb Improvements	50	90	3,906	0	0	5,997
W1278	Air Delivered Depth Bomb	0	0	1,496	1,171	973	3,640
W1341	25mm Gun and Depleted Uranium Round	10,609	20,830	1,377	775	3,936	37,527
	Quantity (Operational Test and Evaluation)				(4)		

Total Estimated Cost Includes FY 1980 & prior year costs of 4,296 for project W0635, Air Inflatable Retarder

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The program element constitutes the principal Navy effort devoted to maintaining the combat effectiveness of unguided conventional air delivered general purpose munitions usable against a wide spectrum of targets in support of multiple tactical missions. The program element consists of selected full scale engineering development projects transitioned from advanced development programs. Several are joint Service projects with the Navy serving as the Executive Service for development or as a participant in other lead Service programs. The scope of the work accomplished varies with the project, but in general encompasses all acquisition tasks including prototype design and item fabrication, contractor and Service laboratory testing, design of production representative end items, developing agency technical test and evaluation, Service operational test and evaluation, and initial production planning. The projects included in this program element respond to Service operational requirements which reflect the need to introduce major improvements to existing munitions or develop new armaments when it is found to be technically or fiscally impractical to modify existing munitions to satisfy the Service's combat needs. The program element currently consists of five active engineering development projects, four of which require FY 1983 resources. These projects are: GATOR - an air delivered land mine cluster munition which satisfies the joint Navy and Air Force need to defeat armored ground forces by interdicting, canalizing and immobilizing personnel and vehicles. Fuel Air Explosive Weapon II - a unitary fuel air explosive weapon for effective attack of material targets and troops, destruction of aircraft on the ground in revetments, for clearing land mine fields and for producing maximum destruction of targets sensitive to blast. Development work was stopped on the 2,000 pound weapon upon the withdrawal of the Air Force from this project. Development will continue on the 500 pound weapon, as the smaller weapon is preferred by the Navy and Marine Corps.

against targets which have become less vulnerable to blast and fragment effects through hardening, to reduce the safety hazard associated with sensitive explosives currently used in MK80 bombs and to expand the delivery parameters of such bombs consistent with current operational tactics. Air Delivered Depth Bomb - an effective, quick reaction antisubmarine munition to complement torpedos by attacking visual or periscope depth submarine targets. 25mm Gun and Depleted Uranium Round - satisfies the need for an effective, shipboard compatible, high performance gun consistent with the operational mission of the AV-8B.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Fuel Air Explosive Weapon II - Complete Operational Test and Evaluation for the 500 pound class BLU-95/B weapon, certify the BLU-95/B shipping and storage container and obtain an Approval for Service Use. Bomb Improvements - Initiate development of an increase effectiveness MK83 1,000 pound clas bomb, select the optimum general purpose bomb insensitive plastic bonded explosive material from alternative materials developed by the Naval Sea Systems Command, fabricate test quantities and complete qualification, initiating procedures for competitive selection of an industry source for development of a general purpose bomb target detecting device. Air Delivered Depth Bomb - Perform competitive source selection of industry source and initiate development. 25mm Gun and Depleted Uranium Round - Complete Technical and Operational Test and Evaluation of the gun and ammunition. Initiate limited production of 25mm guns consistent with the AV-8B production schedule.

(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 increased by 99 due to a need to support Navy obligations in joint test and evaluation. The FY 1982 Estimate decreased 1,812 due to the transfer of Common Bomb Fuze development to Program Element 64609N and inflation adjustments. The FY 1983 Estimate went from TBD to 7,978 based on the project requirements as reflected in this 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	12,914	15,017	24,061	TBD	TBD	TBD
W0530	GATOR	2,864	1,900	400	TBD	TBD	TBD
	Quantity (Operational Test and Evaluation)				TBD		
W0635	Air Inflatable Retarder	331	0	0	TBD	TBD	TBD
W0636	Fuel Air Explosive Weapon II	6,118	2,458	1,103	TBD	TBD	TBD
	Quantity (Operational Test and Evaluation)				TBD		
W1051	Bomb Improvements	1,601	50	1,687	TBD	TBD	TBD
W1278	Air Delivered Depth Bomb	0	0	0	TBD	TBD	TBD
W1341	25mm Gun and Depleted Uranium Round	0	10,609	20,871	TBD	TBD	TBD
	Quantity (Operational Test and Evaluation)				TBD		
W1358	30mm Gun Pods	2,000*					

Program Element: 64603N
Title: Unguided Conventional Air Launched Weapons
DoD Mission Area: 223 - Close Air Support and Interdiction
Budget Activity: 4 - Tactical Programs

* Transferred to USAF 30mm Gun Pod program from Project W1358.

(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						
GATOR	0	0	0	25,137	145,229	170,366
(Quantity)	0	0	0	842	5,224	6,066
Fuel Air Explosive Weapon II	0	0	0	34,043	142,899	176,942
(Quantity)	0	0	0	2,300	11,500	TBD
25mm Ammunition	0	4,100	16,300	35,600	TBD	TBD
(Quantity)	0	116,000	280,000	790,000	TBD	TBD
Aircraft Procurement, Navy						
25mm Gun System	0	4,500	7,100	12,300	TBD	TBD
(Quantity)	0	12	18	30	TBD	TBD

Program Element: 64603N Title: Unguided Conventional Air Launched Weapons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: GATOR: This is a Joint Service Program with the Air Force as lead service and the Army developing the land mines with Navy/Marine Corps participation. The mine system consists of a mixture of anti-personnel and anti-vehicle/tank mines designed for launch from high speed aircraft. Both the anti-tank and anti-personnel mines are identical in geometry enabling the use of standardized parts. Target detection and classification is accomplished by tripline sensors for personnel and magnetic sensors for the anti-tank mine. Operational Test and Evaluaton revealed the need for increaed delivery flexibility not achievable with the existing GATOR dispenser mechanical time fuze. The inability to vary preselected fuze settings seriously restricts delivery flexibility of GATOR and other dispenser type weapons in the event weather, defenses or other constraints preclude the execution of preplanned delivery maneuvers. Resolution of this operational deficiency is dependent on the acquisition of a dispenser proximity fuze. Fuel Air Explosive Weapon II - Fuel Air Explosive II is a 500 pound, low drag free-fall bomb with a primary kill mechanism of blast or overpressure impulse. The weapon consists of a unitary bomb which can be carried at supersonic speeds and will operate over a wide range of impact velocities and angles of attack. The weapon is unique in overcoming the degrading effects of protection measures under typical combat conditions, in clearing landing zones of mines and booby traps and breeching/clearing minefields. Bomb Improvement Program - The bomb improvement program will insure that general purpose bombs remain an effective part of the air launched weapons inventory though development of the following projects elements: (1) MK-83 modifications to insure bomb component integrity and to provide effective penetration of moderate hard targets when delay fuzing is selected or to increase effectiveness when employed in an above ground mode through controlled fragmentation; (2) qualification and use of plastic bonded insensitive high explosives in future bomb procurements, (3) development of a new proximity sensor for above-ground bomb functioning. Existing Navy fuzes, such as the MK-344 and MK-376 have serious logistic, operational flexibility and reliability shortcomings, the most significant being a high dud rate and premature firings. In order to overcome these shortcomings, the Air Force and Navy initiated separate programs to develop a bomb fuze (FMU-112/B and FMU-117/B respectively) to meet service peculiar requirements. The Under Secretary of Defense for Research and Engineering instructed the Navy to redirect the FMU-117/B fuze program and exercise lead service responsibility for the joint Navy/Air Force development of a low cost Common Bomb Fuze, the FMU-139/B. The FMU-139/B Common Bomb Fuze will be compatible with the MK 80 series bombs now in the inventory and improved bombs under development, and compatible with Navy fuze function control sets and Air Force ground selectable arming time settings. Air Delivered Depth Bomb - The Air Delivered Depth Bomb will be NATO interoperable and will be a MK-82 depth bomb utilizing improved delay fuzing and retardation to permit low altitude delivery. It will complement the antisubmarine torpedo for attack against surfaced or shallow-running submarines. 25 MM Gun and Depleted Uranium Round - Congress directed the initiation of a 25 MM Gun and Depleted Uranium Round development program during FY 1980 Defense Appropriation deliberations. Concern over proliferation of gun systems also directed desirability and feasibility of standardizing on one gun system. The Marine Corps study selected the 25 MM gun as the optimum system. Congress subsequently authorized continued development of the 25 MM system.

Program Element: 64603N Title: Unguided Conventional Air Launched Weapons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) RELATED ACTIVITIES: GATOR - Program Element 64602F, Project 2573, Air Force Lead Activity/Army and Navy participating. Fuel Air Explosive II - Program Element 64602F, Project 4535, Navy Lead Activity/Air Force participating. Bomb Improvement Program - Program Element 64609N, Navy Lead Activity/Air Force participating. This Program Element was established in FY 1981 with a new start, below threshold reprogramming. The Air Force is participating under Program Element 64602F.

(U) WORK PERFORMED BY: GATOR: In-House: Naval Weapons Center, China Lake, CA. Contractor: Honeywell Inc., Hopkins, MN., Aerojet Inc., Downey, CA, Others: Headquarters Armament Division, Eglin AFB, FL. Fuel Air Explosives: In-House: Naval Weapons Center, China Lake, CA. Contractors: Honeywell Inc., Hopkins, MN., Motorola, Inc., Scottsdale, AZ. Others: Picatinny Arsenal, Dover, NJ; Headquarters Armament Division, Eglin AFB, FL. Bomb Improvement: In-House: Naval Weapons Center, China Lake, CA. Contractor: Motorola, Inc., Scottsdale, AZ for FMU-139/B program. Others: Headquarters Armament Division, Eglin Air Force Base, FL. Air Delivered Depth Bomb: In-House: Naval Weapons Center, China Lake, CA. Contractor: To be determined. Others: Headquarters Armament Division, Eglin Air Force Base, FL. 25 MM Gun and Depleted Uranium Round: In-House: Naval Weapons Center, China Lake, CA. Contractor: General Electric, Burlington, VT, McDonnell Douglas, St. Louis, MO, Honeywell Inc., Hopkins, MN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: GATOR: Full system engineering development tests were completed. Fuel Air Explosive: Commenced engineering development testing of 500 lb weapon to determine subsystem and functional characteristics. Initiated long lead procurement of hardware for technical evaluation. Bomb Improvement: FMU-117/B selected as the fuze to incorporate Air Force requirements for a Common Bomb Fuze (FMU-139/B). The program was initiated in FY 1980. Program documentation, such as the Draft Development Specification, Joint Development Plan, and Test and Evaluation Master Plan have been promulgated for review and comments. FY 1980 funding was deferred for much of the year pending the outcome of the FMU-112/B and FMU-117/B evaluations for conversion to the FMU-139/B Common Bomb Fuze. Competitive contract awarded in December, 1980. 25 MM Gun and Depleted Uranium Round: Completed effectiveness analysis of 25 MM versus 30 MM. Awarded contract to demonstrate feasibility on the A-8a/B. Conducted design effort for production version gun system, loader and round.

2. (U) FY 1982 Program: GATOR: Complete Operational Test and Evaluation. Obtain Approval for Service Use. Fuel Air Explosive: Establish production model baseline, design and fabricate Technical and Operational Evaluation units. Perform Technical Evaluation. Conduct aircraft compatibility and ship suitability tests. Fabricate prototype containers. Bomb Improvement: Continue development of the Common Bomb Fuze. Fabricate 3000 prototype units for Navy technical evaluation. Evaluate alternative plastic bonded explosive materials for future bomb procurement. Conduct design studies for the improved MK-83. Initiate industry source selection for Target Detecting Device development. 25 MM Gun and Depleted Uranium Round: Commence full scale development of gun system and loader. Initiate technical evaluation of depleted uranium armor piercing rounds, high explosive incendiary and target practice ammunition.

Program Element: 64603N Title: Unguided Conventional Air Launched Weapons
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: GATOR: Not applicable. Fuel Air Explosive: Conduct ship suitability and aircraft compatibility evaluations and certify container. Complete Operational Test and Evaluation and obtain Approval for Service Use. Bomb Improvements: Common Bomb Fuze transferred to PE 64609N Fabricate test quantities of selected plastic bonded explosive materials and complete qualification. Perform concept tests for MK 83 improvement. Air Delivered Depth Bomb: Complete concept investigation with NATO co-development partner(s). Select system configuration. 25 MM Gun and Depleted Uranium Round: Conduct ground tests and initiate Operational Test and Evaluation of gun system installed on AV-8B FSD aircraft number 4. Commence limited production of twelve GAU-12/U 25 mm guns.

4. (U) FY 1984 Planned Program: Fuel Air Explosive: Not applicable. Bomb Improvement: Not applicable. Air Delivered Depth Bomb: Initiate subsystem and component design. Fabricate Engineering Development units. 25 MM Gun and Depleted Uranium Round: Complete loader and gun development including Technical and Operational Test and Evaluation. Obtain Approval for Service Use.

5. (U) Program to Completion: Air Delivered Depth Bomb: Complete technical and operational evaluations. 25 MM Gun and Depleted Uranium Round: Commence production deliveries. Conduct Follow-on Test and Evaluation.

6. (U) Milestones: Not applicable.

Project Nurber: W1341
Program Element: 64603N
DoD Mission Area: 223 - Close Air Support and Interdiction

Title: 25 MM Gun and Depleted Uranium Round
Title: Unguided Conventional Air Launched Weapons
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND DESCRIPTION: A 25 MM aircraft cannon has been developed by industry, using independent research and development funds. This cannon has demonstrated the desired aircraft gun performance, capable of defeating the projected "harder" targets in both the air-to-air and air-to-surface 1980's scenarios. Because of its light weight and compact size the 25 MM cannon has applicability to a wide variety of platforms. Since no aircraft-fired armor-piercing round exists in the Navy inventory, such a round will be developed using a high density penetrator. An ammunition loader and other peculiar support equipment will also be developed.

(U) RELATED ACTIVITIES: Navy/Marine Corps 25 MM aircraft gun system development ongoing for the AV-8B. US Air Force GAU-8 and GPU-5/A (30 MM) Program Office. Army M-79 Series 25MM ammunition.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA. Contractor: General Electric Inc., Burlington, VT., McDonnell/Douglas Inc., St. Louis, MO., Honeywell Inc., Hopkins, MN.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Analysis of effectiveness completed on 25 MM and 30 MM guns. Marine Corps study selected the 25 MM as optimum system. Contract options exercised with General Electric in March 1981 for full-scale development. Conducted two prototype gun and armor piercing projectile flight demonstration tests using a modified AV-8A aircraft.

2. (U) FY 1982 Program: Continue full scale development of gun system, loader and peculiar support equipment. Complete development and deliver test quantities of the Depleted Uranium round. Conduct Critical Design Review.

3. (U) FY 1983 Planned Program: Deliver 4 pre-production gun systems. Install gun on AV-8B and conduct ground and Board of Inspection and Survey testing. Complete Qualification testing.

4. (U) FY 1984 Planned Program: Complete Operational Test and Evaluation. Obtain Approval for Service Use concurrent with that of the AV-8B. Limited production guns (12) will be de during the first and second quarters with Low Rate Initial Production (24 guns) starting in the third quarter.

5. (U) Program to Completion: Continue production deliveries at the full rate of 54 guns per year.

6. (U) Milestones: Not applicable.

Project Number: W1341
Program Element: 64603N
DoD Mission Area: 223 - Close Air Support and Interdiction

Title: 25 MM Gun and Depleted Uranium Round
Title: Unguided Conventional Air Launched Weapons
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
W1341	25 MM Gun and Depleted Uranium Round	10,609	20,830	1,377	775	3,936	37,527

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64604N
Title: Chemical Warfare Weapons
DoD Mission Area: 275 - Retaliatory Chemical 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	7,497	8,066	3,458	887	33,440*
WO637	BIGEYE	0	7,497	8,066	3,458	887	33,440

* Does not include $1,707 funded by Air Force in FY 1981.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program constitutes the total Navy effort in acquiring a retaliatory air delivered chemical weapon. BIGEYE satisfies the Navy and Air Force requirements for a chemical weapon that is environmentally safe for storage and handling and can be deployed onboard aircraft carriers and logistic support force ships. Current chemical weapons require special storage facilities or special monitoring.

BIGEYE is a joint Service project with the Navy as the lead Service and the Air Force as a participating Service. The Army is also participating as the developing agency for the chemical reactants used in the BIGEYE weapon.

(U) BASIS FOR FY 1983 RDT&E REQUEST Continue fabrication of prototype weapons and containers. Conduct qualification testing of shipping containers. Conduct ship suitability testing. Conduct a Navy Technical Evaluation and an Initial Operational Test and Evalation period on which to base a full production decision. 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 BIGEYE project was not funded in the Navy appropriation in FY 1981. The Air Force provided 1,707 to sustain the project at a reduced scope. The Secretary of Defense directed an accelerated program on 21 December 1981 which led to the following adjustments: FY 1982 was increased by 3,715, FY 1983 was increased by 6,017; the Additional to Completion was increased by 4,345, and Total Estimated Cost increased by 14,077. This includes all work done on the project since it's beginning in the late 1960's, but does not include the Air Force funding of 1,707 in FY 1981.

Program Element: 64604N
DoD Mission Area: 275 - Retaliatory Chemical Warfare

Title: Chemical Warfare Weapons
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	2,507	0	3,782	2,049	0	19,363
W0637	BIGEYE	2,507	0	3,782	2,049	0	19,363

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	0	0	25,676	47,551	78,787	152,014
Quantity	0	0	TBD	TBD	TBD	TBD

Program Element: 64604N
DoD Mission Area: 275 - Retaliatory Chemical Warfare

Title: Chemical Warfare Weapons
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The current inventory of Navy air delivered lethal chemical weapons consist of the AERO-14B spray tank, the MK 94 bomb and WETEYE.

With the advent of the binary system of agent generation, lethal chemical agents could be safely stored and carried aboard ships. BIGEYE tests have indicated that the ships personnel can safely assemble binary weapons in less than four man-minutes and aircrews can deliver them with existing cockpit controls. Extensive expertise in design, testing and documenting of binary components was gained in the late sixties. During this program Navy emphasis was placed on details of handling and packaging to ensure that the weapon would be compatible with existing fleet handling methods. The BIGEYE program was "temporarily terminated" in September 1969. The program was restarted in 1977. BIGEYE is a 500 pound binary spray bomb which utilizes two non-toxic chemical reactants for the generation of the lethal agent. No lethal agent will be stored aboard ship as the reactants will be stowed separately. The reactants will be assembled in the weapon.

(U) RELATED ACTIVITIES: Feasibility of the binary concept was supported by the Navy and conducted by the Army. The Air Force is participating in this program under Program Element 64601F. The Defense Science Board has concluded that modernization of the deterrent stockpile is essential and funding will likly be approved for a binary production facility.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA. Contractors: The Marquardt Company, Van Nuys, CA. Others: Chemical Systems Laboratory, Edgewood Arsenal, Edgewood, MD; Headquarters Armament Division, Eglin AFB, FL.

PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Development was recommended as a Joint Service program in 1976 after termination in 1969. A prototype fabrication and redesign contract was awarded in 1977. Component qualification testing was completed. Toxic agent evaluation and testing and dissemination evaluation and testing was initiated. Work commenced on a dissemination simulant. Prototype fabrication of engineering hardware was completed. Toxic evaluation and weapon qualification tests were continued. Aircraft compatibility testing and evaluation was completed. Based on this evaluation a minor modification to the BIGEYE tail fins was designed and tested. Environmental and safety tests were completed with the exception of fast cookoff tests. Agent dissemination tests were successfully concluded.

2. (U) FY 1982 Program:

Continue toxic agent evaluation and testing.

Conduct functional and physical configuration audits.

Program Element: 64604N
DoD Mission Area: 275 - Recaliatory Chemical Warfare

Title: Chemical Warfare Weapons
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: Make decision based on results of the Navy Preliminary Evaluation conducted in late FY 1982. Continue fabrication of prototype weapons and containers. Complete toxic agent evaluation and testing. Conduct qualification testing of shipping container. Conduct ship suitability testing. Conduct Navy Technical Evaluation and Initial Operational Test and Evaluation period on which to base a full production decision.

4. (U) FY 1984 Planned Program: Complete Operational Test and Evaluation and document the Technical Data Package

5. (U) Program to Completion: Transition to Army Single Manager in FY 1985.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64607N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Electro Optic Sensor Devices
Budget Activity: 4 - Tactical Program

(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	17,035	6,891	10,422	10,975	TBD	TBD
S0301	Fire Control Subsystem Electro-Optics (SEAFIRE)	12,371	0	0	0	TBD	TBD
X0665	Infrared Search and Track	4,664	6,891	10,422	10,975	43,789	85,442

* Total Estimate Cost includes prior year funding under Program Element 63797N Surface Electro-Optical Systems Advanced.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: S0301-SH Fire Control Subsystem Electro Optics (SEAFIRE) will provide an electro-optical sensor system for gun fire control systems to track surface, shore and air targets and provide precision target tracking data for engagements [ ] As a subfunction, an installed laser will illuminate surface and shore targets for laser guided ordnance. Basic components of the shipboard systems include day television, thermal imaging sensor, laser rangefinder/illuminator, stabilized pedestal for precision pointing, associated servo-electronics, video and digital processors, fire control system interface equipment, displays and controls. Although started initially for use with the MK 86 Gun Fire Control System, SEAFIRE is designed for ease of integration with other fire control systems. X0665 Infrared Search and Track (AN/SAR-8) provides for [ ] Detected targets will be handed off to ship weapon and data systems for further action. The Infrared Search and Track system will supplement surveillance radar systems during periods of radar frequency emission control and jamming, and when under attack by anti-radiation missiles.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0301 Fire Control Electro-Optics (SEAFIRE): Not funded in FY 1983. X0665 Infrared Search and Track: Continue full Scale Engineering Development. Complete Engineering Development and design. Commence detailed ship plans installation. Conduct ship installation cost and feasibility studies. Conduct critical design review. The increased funding between FY 1982 and FY 1983 (3,531) is due to the preparation of system detailed engineering design, validation of software development, and installation cost and feasibility to keep engineering development on schedule. The above funding profile includes outyear escalation and all work or development phases through FY 1984 for project S0301 and to completion for project X0665.

Program Element: 64607N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Electro Optic Sensor Devices
Budget Activity: 4 - Tactical Program

(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. S0301 Fire Control Subsystems Electro-Optical (SEAFIRE): An increase of 1,794 in FY 1981 due to program restructuring. X0665 Infrared Search and Track. Minus 700 (FY 1981) is due to reprogramming to a higher priority program. Minus 312 (FY 1982) is due to mandated military budget reductions and routine budget adjustments. FY 1983 to Completion now reflects estimated requirements which were labeled TBD "To Be Determined" on 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	10,875	15,941	7,203	TBD	TBD	TBD
S0301	Fire Control Subsystem Electro-Optics (SEAFIRE)	10,875	10,577	0	TBD	TBD	TBD
X0665	Infrared Search and Track	0	5,364	7,203	TBD	TBD	TBD

Program Element: 64607N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Electro Optic Sensor Devices
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: Requirements exist to augment existing radar type systems with systems which have the capability to perform search and fire control functions in a totally passive mode and to provide improvements that allow operation where radars are deficient. Functions which must be performed include search, detection, track, identification, designation, and illumination. A shipboard combat system must include an integrated mix of compatable equipments and equipment types to be effective against the anticipated threats in the expected environments. This fundemental principle has been recognized and requirements have been established for two types of electro-optical systems: a search and track system and a fire control system. Project S0301, Fire Control Subsystem Electro-Optics (SEAFIRE), is in response to the January 1977 Operational Requirement 0301-SH to meet the need for an electro-optical fire control channel for gun fire control systems, will provide a lightweight modular electro-optical fire control channel. It also provides a capability to illuminate targets for the Semi-Active Laser Guided Projectile. Project X0665 Infrared Search and Track (AN/SAR-8). The function of the AN/SAR-8, in response to Operational Requirement AA10 is to provide passive detection of missiles, aircraft, and surface ships over a 360 degree azimuth field of view as do search radars.

Both of the previously discussed systems have a surface detection capability and a passive navigation and station keeping capability. The Light Airborne Multi-Purpose System Electro Optical Pod was a feasibility effort commenced under this program element in 1977 utilizing The Project was not funded after FY 1979.

(U) RELATED ACTIVITIES: Project S0301 Fire Control Subsystem Electro Optics (SEAFIRE): PE 64651N; Project S0178 MK 86 Gun Fire Control System: PE 64652N; Project S0328 MK 68 Gun Fire Control System Modernization: PE 64602N Gun Ammunition Improvement Program; Project S1046 5-Inch Guided Projectile System Integration; PE 64608N Joint Army/Navy Semi-Active Laser-Guided Projectile Engineering Development; Project S0305 5-Inch Semi-Active Laser-Guided Projectile. Project X0665 Infrared Search and Track System: Canadian Department of National Defence Shipboard Passive Surveillance and Detection System Development; PE 64554N Surface Electronic Warfare Program; PE 64761N, Project X0809 Electro-Optic Sensor Development.

(U) WORK PERFORMED BY: Project S0301 Fire Control Subsystem Electro Optics (SEAFIRE). Honeywell, Incorporated, West Covina, California is the prime contractor; Northrop, Incorporated, Anaheim, California is a major sub-contractor. In-house activities: Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, Virginia; Naval Ship Weapon Systems Engineering Station, Port Hueneme, California. Project X0665 Infrared Search and Track System. SPAR Aerospace, Toronto, Ontario prime contractor, General Electric Company, Syracuse New York; Barnes Engineering, Stanford, CT; Aerojet Electro Systems, Azusa, CA; Block Engineering, Cambridge, MA; Hollandse Signaal Apparaten, B.V. Hengelo, the Netherlands are subcontractors. In House: Naval Surface Weapons Center White Oak Laboratory, Silver Spring Maryland, Naval Ship Weapon Systems Engineering Station, Port Hueneme California, Naval Research Laboratory, Washington, DC; Canadian in-house: Defence Research Establishment, Valcartier, Quebec.

Program Element: 64607N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Electro Optic Sensor Devices
Budget Activity: 4 - Tactical Program

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0301 Fire Control Subsystem Electro Optics (SEAFIRE). Studies by Naval Surface Weapons Center, Dahlgren beginning in June 1976 resulted in preparation of drafts of a program documentation suite including: Development Proposal, System Specification, Program Master Plan, Test and Evaluation Master Plan, Procurement Plan, and Navy Decision Coordinating Paper. Three study contracts let to Texas Instruments, Inc.; Aeroneutronics-Ford, Inc.; and Hughes Aircraft Corp. resulted in reports which in FY 1977 established expected environmental conditions, expected electro-optical sensor performance and cost/performance trade-offs. A Request for Proposal was released to industry in September 1978. Offers were received in January 1979 and the Engineering Development contract awarded to Honeywell, Inc. in July 1979. Preliminary design review was conducted in January 1980. Critical design reviews have been completed on several system components and some fabrication has commenced. Two SEAFIRE Engineering Development Models capable of interfacing with the MK 86 Gun Fire Control System will be built. Project X0665 Infrared Search and Track System. All FY 1980 and prior accomplishment under P.E. 63797N. Program commenced in FY 1976. Advanced development was accomplished jointly with Canada under a Memorandum of Understanding with the Department of National Defence for joint testing and a Project Agreement with Department of Industry Trade and Commence for joint project funding. Advanced Development Infrared Search and Track Model completed in FY 1978. Completed Developmental Testing IIA aboard HMCS Algonquin (DDH 283). Completed land based test at Key West, Florida. Completed Developmental Test-IIB aboard USS KINKAID (DD-965) in FY 1979[ ] FY 1980 funding was deleted by authorization conference action without prejudice pending submittal of a shipboard implementation plan for infrared systems including Infrared Search and Track.

2. (U) FY 1982 Program: Project S0301 Fire Control Electro Optics (SEAFIRE). Not funded in FY 1982. Continue low-level development of SEAFIRE subsystem and SEAFIRE interface with MK 86 Gun Fire Control System with small amount of remaining FY 1981 funds and possible small reprogramming awaiting Navy decision to fund or not fund the program. Conduct system Critical Design Review. Project X0665 Infrared Search and Track. Award Full Scale Engineering Development contract.

3. (U) FY 1983 Planned Program: Project S0301 Fire Control Electro Optics (SEAFIRE). Not funded in FY 1983. X0665 Infrared Search and Track System. Continue Full-Scale Engineering Development. Complete engineering development design. Conduct critical design review. The increased funding of 3,531 between FY 1982 and FY 1983 is due to preparation of system detailed engineering design validation of software development installation cost and feasibility studies to keep engineering development on schedule.

4. (U) FY 1984 Planned Program: Project S0301 Fire Control Electro-Optical (SEAFIRE). Not funded in FY 1984. Project X0665 Infrared Search and Track System. Continue fabrication and testing of engineering development models. Complete integration design specifications for all ship classes.

Program Element: 64607N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Electro Optic Sensor Devices
Budget Activity: 4 - Tactical Program

5. (U) Program to Completion: Project S0301 Fire Control Electro-Optical (SEAFIRE). To be determined. Project X0665 Infrared Search and Track System. Complete Engineering Development. Perform Development Test III and Operational Test III. Commence production in FY 1987.

6. (U) Milestones: Project X0665, Infrared Search and Track.

US/Canada Agreement negotiated and signed	*(Apr 1981)	Jan 1982
Award Engineering Development Contract	*(Jun 1981)	Apr 1982
Critical Design Review	*(Sep 1982)	Aug 1982
Last Engineering Development Model Complete	*(Jan 1984)	May 1985
Development Testing	*(Sep 1983)	Apr 1986
Operational Testing	*(Jan 1985)	Sep 1987
Approval for Service Use	*(Sep 1985)	Apr 1987
Navy Acquisiton Review Council III	To be determined	To be determined

*Dates in parens are milestone dates shown in FY 1982 program Element Descriptive Summary. Slippages are due to the delay in signing the US/Canada Agreement. The September 1983 date was in eror, should have been 1985.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64608N
Title: Joint Army/Navy Semi-Active Laser Guided Projectile (Engineering)
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	22,753	3,116	995	0	0	*140,572
S0305	5-Inch Semi-Active Laser Guided Projectile	22,753	3,116	995	0	0	122,187
	Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(105)

*The total estimated cost includes prior funding appropriated under Program Element 64602N, Program Element 64655N Gun Ammunition Improvement Program, and project S0330 previously in this Program Element 64608N (8-inch Guided Projectile).

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element encompasses design and fabrication for development of Semi-Active Laser Guided Projectiles to provide a capability for effective gun engagement of moving hard point targets outside visual ranges. In FY 1977, management of the development of all Department of Defense Semi-Active Laser Guided Projectiles was centralized under a single Joint Army/Navy Guided Projectile Project Office. This program element addresses work performed by the Joint Army/Navy Semi-Active Laser Guided Projectile prime contractor to design and fabricate Naval use, 5-inch Semi-Active Laser Guided Projectiles and components for Test and Evaluation. For budgetary reasons, in FY 1978, work on the Navy's Major Caliber Lightweight Gun and associated 8-Inch guided projectiles and system integration were suspended. As a result of Congressional action, the remainder of the 5-Inch Semi-Active Laser Guided Projectile program was restructured, and Operational Evaluation, Defense Systems Acquisition Review Council review, and Initial Operational Capability were delayed. Operational Evaluation was successfully completed in August 1981.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funding will complete the Guided Projectile development effort. A decision on procurement is pending, and procurement funding is not currently in the budget. Development of a microelectronic processor for increased guidance system control, target detection and counter-countermeasures processing and a new penetrating warhead and propellant change will be evaluated. The decrease from FY 1982 to FY 1983 (2,121 thousands) is the result of limiting the development effort to that required to complete documentation of the current Semi-Active Laser Guided Projectile round.

Program Element: 64608N
DoD Mission Area: 232 - Amphibious, Strike, Anti Surface Warfare

Title: Joint Army/Navy Semi-Active Laser Guided Projectile (Engineering)
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: In FY 1981, four separate reprogramming actions increased the program by 1,693 because of increased program and testing costs. In FY 1982, a decrease of 143 to reflect minor program and inflation adjustments. In FY 1983, an increase of 180 to provide additional funds to complete program documentation.

(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	11,016	21,060	3,259	815	0	*138,842
S0305	5-Inch Semi-Active Laser Guided Projectile	11,016	21,060	3,259	815	0	128,457
	Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(105)

* The total estimated cost includes prior funding appropriated under Program Element 64602N, and Project S0330 of this Program Element 64603N (8-Inch Guided Projectile).

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 64608N
Title: Joint Army/Navy Semi-Active Laser Guided Projectile (Engineering)
DoD Mission Area: 232 - Amphibious, Strike, Anti Surface Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The need to provide precisely accurate naval gunfire against targets ashore and to reduce ammunition expenditures necessitates that the "Smart Ordnance" (Guided Projectile) concept be applied to gun-fired projectiles through the incorporation of terminal homing techniques. The 5-Inch Guided Projectile will be compatible with existing 5"/54 gun mounts and gun fire control systems. S0305, 5-Inch Semi-Active Laser Guided Projectile: The 5-Inch Guided Projectile is comprised of a seeker, warhead, control and rocket motor sections. It is canard controlled and fin stabilized in a slowly rolling airframe. Potentially up to 154 ships with 242 existing 5"/54 caliber guns could be provided with Guided Projectile capability to significantly improve first round accuracy against surface targets (land and sea). The design goal is a [redacted] Circular Error Probable at ranges to [redacted] The 5-Inch Guided Projectile is 61 inches long, weighs 104 pounds, and delivers a 34 pound [redacted] In FY 1980 and 1981, 105 5-Inch Semi-Active Laser projectiles were be procured (using RDT&E,N funds) for development tests and Technical and Operational Evaluation.

(U) RELATED ACTIVITIES: PE 64602N, Project S1046, 5-Inch Guided Projectile Systems Integration; PE 64607N, Project S0301, Fire Control Subsystems Electro Optics, PE 64652N, Gun Systems Improvement Program; PE 64606M, USMC Laser Homing Ordnance, PE 64612A, Army 155mm Anti-Tank Cannon Launched Guided Projectiles.

(U) WORK PERFORMED BY: In-House: The Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, VA, provides technical support for all Guided Projectiles. Other supporting in-house activities for Guided Projectiles include: Naval Weapons Center, China Lake, CA; Naval Avionics Center, Indianapolis, IN; Naval Ordnance Station, Yorktown, VA, Harry Diamond Laboratories, Adelphi, MD; Naval Surface Weapons Center, White Oak, Silver Spring, MD, and Naval Ordnance Station, Indian Head, MD. Contractors: Martin Marietta, Orlando, FL, is Prime Contractor for Joint Army/Navy Guided Projectile Program; Chandler Evans of Hartford, CT, supplies control systems of Guided Projectiles.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0305, 5-Inch Semi-Active Laser Guided Projectile: The 5-Inch Guided Projectile was placed in Advanced Development in FY 1977 in PE 63302N, Long Range Surface Weapons Systems. Two seekers (Semi Active Laser and Infrared) for the 5-Inch Guided Projectile were designed, fabricated, and gun tested for survivability and functional response. 5-Inch rocket motor, fuze and warhead designs were initiated. Thirty-eight integration tests and Advanced Development projectiles fabricated under this project were fired (Semi-Active Laser and Infrared systems) demonstrating effectiveness against fixed/moving hard point shore targets, and water-borne surface targets and the 5-Inch Semi Active Laser Guided Projectile entered Engineering Development in FY 1977. The Infrared version successfully engaged [redacted] at the Naval Surface Weapons Center, Dahlgren, VA test range. In FY 1978 the associated 8-Inch Guided Projectile

Program Element: 64608N
DoD Mission Area: 232 - Amphibious, Strike, Anti Surface Warfare

Title: Joint Army/Navy Semi-Active Laser Guided Projectile (Engineering)
Budget Activity: 4 - Tactical Programs

engagement at the Naval Surface Weapons Center, Dahlgren, VA test range. In FY 1978 the associated 8-Inch Guided Projectile Program was terminated and funding deferrals, associated delays in release of the 5-Inch program to Engineering Development, plus technical difficulties encountered by the prime contractor in adapting electronic packaging and gyro structure to the gun environment led to restructuring of the 5-Inch program into a single lot (Army) approach. A fifty percent FY 1980 Congressional budget cut caused a further restructuring reducing program test quantities from 182 to 105 and, because FY 1981 OPN funding for initial production rounds had to be reallocated to RDT&E (in order to compensate for FY 1980 cuts) initial operational capability was slipped to[illegible]. Technical and Operational Evaluation were sucessfully completed in FY 1981, and Provisional Approval for Service Use was recommended. Demonstrated reliability averaged 80 percent.

2. (U) FY 1982 Program: Final update of Technical Data Package incorporating design modifications resulting from Operational test and evaluation experience. Approval for Service and Defense System Acquisition Release to full production will be requested.

3. (U) FY 1983 Planned Program: Development of micro processor design to enable increased guidance system control, target detection, and counter-countermeasures processing and new penetrating warhead, propellant change and interface with advanced (Army) seekers will be evaluated. Conduct Follow-on Test and Evaluation as required.

4. (U) FY 1984 Planned Program: Not funded in FY 1984 and beyond.

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

6. (U) Milestones:

		Date
a.	Defense Systems Acquisition Council II Release to Engineering Development	November 1977
b.	Initiate Developmental and Operational Test III	April 1981
c.	Complete Operational Test	August 1981
d.	Initial Operational Capability	To be Determined

FY 1983 RDT&E DESCRIPTION SUMMARY

Program Element: 64609N Title: Common Bomb Fuze
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	1,600	1,597	1,306	0	0	5,903
W1512	Common Bomb Fuze	1,600	1,597	1,306	0	0	5,903
	Quantity (Development Test and Evaluation/Operational Test and Evaluation)						(880)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Several significant deficiencies exist with the MK 80 series general purpose bomb fuzes. These include a high early burst rate and the need for two separate Navy electric fuzes to provide for all tactical deliveries. Present fuzes have poor arming time tolerances (up to plus or minus 10%). The Navy was selected as lead service for the Joint Service Common Bomb Fuze development by USDRE memo of 11 April 1980. This common bomb fuze (FMU-139/B) will be compatible with the MK 80 series bombs now in the inventory, with improved bombs now under development, with Navy fuze function control sets and with Air Force ground selectable arming time requirements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Fabrication of 500 fuzes for operational testing will be completed in the first quarter of FY 1983. Navy OPEVAL and Air Force Initial Operational Test and Evaluation will be completed. Approval for Service Use is expected during the last quarter 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: This effort was previously included in the Unguided Conventional Air Launched Weapons Program (PE 64603N), Bomb Improvements (Project W1051). In FY 1981 1,600 was reprogrammed to PE 64043N and then transferred to this new program element. In FY 1982 1,597 was transferred from PE 64603N, Project W1051. USAF funding of 1,000 in FY 1981, 700 in FY 1982 and 300 in FY 1983 from PE 64602F are to be applied to the FMU-139/B development.

(U) FUNDING ASSOCIATED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not applicable - FY 1983 is the initial submission.

Program Element: 64609N
DoD Mission Area: 223-Close Air Support and Interdiction

Title: Common Bomb Fuze
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:*

Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN (Common Bomb Fuze)	-	-	-	17,400	167,500	184,900
Quantity	-	-	-	(25,000)	(306,300)	(331,300)

* Navy only, refer to PE 64602F for Air Force requirements.

Program Element: 64609N Title: Common Bomb Fuze
DoD Mission Area: 223 - Close Air Support and Interdiction Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Existing Navy fuzes, such as MK 344 and 376, used in general purpose bombs, have serious logistic, operational flexibility and reliability shortcomings, the most significant being a high dud rate and premature firings. In order to overcome these shortcomings, the Air Force and Navy initiated separate programs to develop a bomb fuze, the FMU-112/B and FMU-117/B respectively, to meet each service's particular requirements. The Under Secretary of Defense for Research and Engineering instructed the Navy to redirect the FMU-117/B fuze program and exercise lead service responsibility for the joint Navy/Air Force development of a low cost Common Bomb Fuze, the FMU-139/B. The FMU-139/B Common Bomb Fuze will be compatible with the MK 80 series bombs now in the inventory, improved bombs now under development and compatible with Navy fuze function control sets and Air Force ground selectable arming time settings.

(U) RELATED ACTIVITIES: The Air Force is participating in this program under Program Element 64602F.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, Ca. Contractor: Motorola, Tuscon, Az. Others: Armament Division, Eglin AFB, Fl.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The program was initiated in FY 1980 as the FMU-117/B. After the program was redirected as a common bomb fuze, the Request for Proposal package was changed to include Air Force performance requirements. A full-scale development contract was awarded to Motorola in December, 1980. A System Design Review was accomplished during March 1981. Eighty (80) engineering units for contractor testing were fabricated.

2. (U) FY 1982 Planned Program: Fabricate 300 prototype units for Navy Technical Test and Evaluation scheduled for completion in August, 1982. Initiate fabrication of 500 operational test units.

3. (U) FY 1983 Planned Program: Initiate and complete Navy Operational Test and Evaluaton and Air Force Initial Operational Test and Evaluation. Obtain Approval for Service Use and complete planning for limited production.

4. (U) FY 1984 Planned Program: Award limited production contract during the first quarter FY 1984. Accomplish any Follow on Test and Evaluation required as a result of Operational Test and Evaluation.

5. (U) Program to Completion: Initiate Low Rate Initial Production in FY 1985 and full-scale production in FY 1986. The fuze will be transferred to the Army Single Manager for competitive, full-scale production starting with the FY 1986 buy.

6. (U) Milestones: Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (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	0	0	58,365	141,185	356,999	556,549
S0199	ALWT	0	0	58,365	141,185	356,999	556,549
	Quantity (Development Test and Evaluation)						(30)
	Quantity (Initial Operational Test and Evaluation)						(77)

(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 as a replacement for the MK 46 torpedo as soon as possible.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The ALWT program is scheduled to commence full scale engineering development in 1983. The increase from FY 1982 to FY 1983 is due to the transition to engineering development. The above funding profile includes outyear escalation and encompasses all work or development phases now or anticipated.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: Not applicable. Program funded under PE 63610N, Advanced ASW Torpedo, in FY 1982 Descriptive Summary.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
WPN	0	0	0	0	3,967,600	3,967,600
Quantity	(0)	(0)	(0)	(0)	(7,743)	(7,743)

Program Element: 64610N
Title: Advanced Lightweight Torpedo (Engineering)
DoD Mission Area: 233 - Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The ALWT will have superior performance characteristics. 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 by the mid-to-late 1980s. The program includes some modifications to make the ALWT more suitable for employment. 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.
The objectives of ALWT development are to: (a) verify with development prototype models that the chosen concepts are sound; (b) verify with 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 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

Program Element 63367N, Submarine Anti-Submarine Warfare Standoff Weapon - Development of a against threat submarines. Program Element 62633N, Undersea Warfare Weaponry Technology -

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA (technical direction 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; 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: 64610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (Engineering)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Funded in PE 63610N in FY 1982 and prior.

2. (U) FY 1982 Planned Program: Funded in PE 63610N in FY 1982.

3. (U) FY 1983 Planned Program: Commence full scale engineering development upon scheduled completion of Milestone II in April 1983. Purchase long lead material required for engineering development. Commence subsystem fabrication of the engineering development torpedo.

4. (U) FY 1984 Planned Program: Continue subsystem fabrication of the engineering development torpedo. Commence delivery of the full system engineering development torpedo and begin performance validation testing. Commence design upgrade of the engineering development torpedo and purchase required long lead material.

5. (U) Program to Completion: Complete full scale development and documentation for Milestone III. The prime contractor will develop the engineering development models for Technical Evaluation and Operational Evaluation and units for prototype production prior to going into full scale production.

6. (U) Milestones:

Milestones	Date
a. Initiated phase I advanced development	February 1975
b. Completed phase I of advanced development	September 1978
c. Initiated phase II of advanced development	August 1979
d. Complete phase II of advanced development	
e. Start technical evaluation	
f. Start initial operational test and evaluation	
g. Approval for Service Use	
h. Initial Operational Capability	

Program Element: 64610N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Advanced Lightweight Torpedo (Engineering)
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: Will be completed in PE 63610N.

2. (U) OPERATIONAL TEST AND EVALUATION:

a. (U) Initial Operational Test and Evaluation: Commander Operational Test and Evaluation Force will conduct early Initial Operational Test and Evaluation by monitoring systems development with the objective of providing an early independent assessment of the potential operational effectiveness and operational suitability of the Advanced Lightweight Torpedo prior to the Milestone II decision. After the Milestone II decision, Commander Operational Test and Evaluation Force will observe engineering development testing through Technical Evaluation. The objectives for the Engineering Development Model system are: determine platform, fire control systems and in-service support equipment compatibility; determine performance, acquisition and hit envelopes against various targets in Countermeasures (CM) and non-CM operational environment; obtain initial assessment of reliability, maintainability and adequacy of system safety; determine adequacy and required modifications to the Workshop Test and Handling Equipment to support the Operational Evaluation; and validate computer simulation models for use in the Operational Evaluation. Once successful completion of Technical Evaluation occurs, Commander Operational Test and Evaluation Force will conduct the Operational Evaluation using 77 pre-production torpedoes, including two warshot configurations. The Operational Evaluation will consist of 165 valid in-water runs against various targets and 2000 computer simulation runs using the Naval Ocean Systems Center Hybrid computer. The objectives of Operational Evaluation are to determine if: pre-production torpedo meets the criteria of the operational requirement; the torpedo can be prepared and maintained by fleet Intermediate Maintenance Activity and depot level personnel, using the torpedo handling equipment and facilities; the torpedo can be effectively employed by fleet personnel; computer simulation of the torpedo and the threat target are adequate to support Follow-on Test and Evaluation as required; the exercise version of the weapon is adequate to support fleet training; mobile and other targets for the torpedo are adequate to support Production and Acceptance Test and Evaluation fleet training and Follow-on Test and Evaluation as required; documentation and modifications to fire control and launch systems are adequate to support the system; system performance is degraded due to interference from projected ASW acoustic sensors (subject to availability), a second ALWT or a torpedo MK 46, and to what extent. Additional objectives of Operational Evaluation include development of initial tactical doctrine, assessment of adequacy of Integrated Logistic Support and training plans, assessment of operational suitability and readiness for approval for service use. Upon completion of Operational Evaluation, Commander Operational Test and Evaluation Force will provide an evaluation report detailing the operational effectiveness and operational suitability of the torpedo and supporting equipment to serve as the basis for the preparation for a production decision.

b. (U) Follow-on Test and Evaluation: The follow-on operational test and evaluation will consist of tests to verify correction of any deficiencies discovered during Operational Evaluation; to verify operational effectiveness and operational suitability of production ALWTs and handling equipment; continued tactics developments; and conduct a captive carry program. Production

Program Element: 64610N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Advanced Lightweight Torpedo (Engineering)
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: Will be completed in PE 63610N.

2. (U) OPERATIONAL TEST AND EVALUATION:

a. (U) Initial Operational Test and Evaluation: Commander Operational Test and Evaluation Force will conduct early Initial Operational Test and Evaluation by monitoring systems development with the objective of providing an early independent assessment of the potential operational effectiveness and operational suitability of the Advanced Lightweight Torpedo prior to the Milestone II decision. After the Milestone II decision, Commander Operational Test and Evaluation Force will observe engineering development testing through Technical Evaluation. The objectives for the Engineering Development Model system are: determine platform, fire control systems and in-service support equipment compatibility; determine performance, acquisition and hit envelopes against various targets in Countermeasures (CM) and non-CM operational environment; obtain initial assessment of reliability, maintainability and adequacy of system safety; determine adequacy and required modifications to the Workshop Test and Handling Equipment to support the Operational Evaluation; and validate computer simulation models for use in the Operational Evaluation. Once successful completion of Technical Evaluation occurs, Commander Operational Test and Evaluation Force will conduct the Operational Evaluation using 77 pre-production torpedoes, including two warshot configurations. The Operational Evaluation will consist of 165 valid in-water runs against various targets and 2000 computer simulation runs using the Naval Ocean Systems Center Hybrid computer. The objectives of Operational Evaluation are to determine if: pre-production torpedo meets the criteria of the operational requirement; the torpedo can be prepared and maintained by fleet Intermediate Maintenance Activity and depot level personnel, using the torpedo handling equipment and facilities; the torpedo can be effectively employed by fleet personnel, computer simulation of the torpedo and the threat target are adequate to support Follow-on Test and Evaluation as required; the exercise version of the weapon is adequate to support fleet training; mobile and other targets for the torpedo are adequate to support Production and Acceptance Test and Evaluation fleet training and Follow-on Test and Evaluation as required; documentation and modifications to fire control and launch systems are adequate to support the system; system performance is degraded due to interference from projected ASW acoustic sensors (subject to availability), a second ALWT or a torpedo MK 46, and to what extent. Additional objectives of Operational Evaluation include development of initial tactical doctrine, assessment of adequacy of Integrated Logistic Support and training plans, assessment of operational suitability and readiness for approval for service use. Upon completion of Operational Evaluation, Commander Operational Test and Evaluation Force will provide an evaluation report detailing the operational effectiveness and operational suitability of the torpedo and supporting equipment to serve as the basis for the preparation for a production decision.

b. (U) Follow-on Test and Evaluation: The follow-on operational test and evaluation will consist of tests to verify correction of any deficiencies discovered during Operational Evaluation; to verify operational effectiveness and operational suitability of production ALWTs and handling equipment; continued tactics developments; and conduct a captive carry program. Production torpedoes and associated equipment will be used during this phase of testing.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64652N
Title: Gun System Improvement Program
DoD Mission Area: 231 - Anti-Air 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	27,956	10,393	10,969	10,648	Continuing	Continuing
S0178	MK 86 Gunfire Control System	5,852	8,051	9,472	10,082	Continuing	Continuing
S0179	MK 92 Fire Control System Upgrade	20,087	*	*	*	*	*
S0328	MK 68 Improvement	2,017	2,342	1,497	566	Continuing	Continuing

* Transferred to PE 64352N Surface Launched Weaponry Ship Systems for FY 1982 and PE 64301N MK-92 Fire Control System in FY 1983 subsequent years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: S0178, MK 86 Gun Fire Control System provides an improved digitally controlled gun weapon system which will enable 5"/54 MK 45 Gun mounts on Destroyers, Guided Missile Destroyers, Nuclear Powered Guided Missile Cruisers and Amphibious Assault Ships to more effectively engage present and future threats. S0328, MK 68 Improvement will provide upgraded components to enable the 5"/54 MK 42 MOD 9 and 10 gun mounts of Frigates, Guided Missile Cruisers and Guided Missile Cruisers (Nuclear) to more effectively engage present and future threats. S0179 MK 92 Fire Control System is a lightweight, high performance, low manning multi-purpose system to provide missile and/or gun control on our Frigate (FFG-7 Class), Partrol Hydrofoils (PHM-1 Class) and Coast Guard WMEC 270 Class.

(U) BASIS FOR FY 1983 RDT&E REQUEST: MK-68 Improvements: Proceed with development of the enhanced Naval Gun Fire Support capability through improved interservice communication links and improved low cost displays which will eliminate typical operator errors as well as reducing operation and support cost; initiate multi target capability and ECM improvements. MK-86 Gunfire Control System: Complete development of SPG-60 air track radar acquisition improvements. Continue ordnance alteration development. Continue Electro-Magnetic Counter Countermeasures improvements for the SPG-60 and SPQ-9 radars. Begin integration of guided missile and survivability improvements. Initiate threat upgrade and modernization program, including expansion of capabilities. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases 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: Changes in the MK 68 Fire Control System,

Program Element: 64652N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Gun System Improvement Program
Budget Activity: 4 - Tactical Programs

decreases of 44 in FY 1981, 116 in FY 1982 and 45 in FY 1983 reflect revision of estimates including inflation and minor reductions made during budget development. Program funds provide for the procurement of hardware and modifications to improve/maintain combat system readiness through improvements to system safety, reliability, maintainability, performance and compatibility. MK 86 Fire Control System decreases of 57 in FY 1981 and 363 in FY 1982 reflect refined estimates of costs including escalation. An increase of 4,528 in FY 1983 reflects increased emphasis on development for integrating SEAFIRE and the desire to accelerate the SPG-60 air track and SPQ-9 surface track improvements for operating in degraded Electro-Magnetic Countermeasures environment; and initiation of the New Threat Upgrade and Modernization Program. MK 92 Fire Control System Upgrade was transferred to Program Element 64352N for FY 1982, and Program Element 64301N MK-92 Fire Control System for FY 1983 and subsequent years. Funding comparison for the MK 92 FCS is contained in Program Element 64301N.

(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	13,120	13,270	10,872	6,486	Continuing	Continuing
S0178	MK 86 Gunfire Control System	5,509	5,909	8,414	4,944	Continuing	Continuing
S0179	*MK 92 Fire Control System	898	5,300	*	*	Continuing	Continuing
S0328	MK 68 Improvement	6,713	2,061	2,458	1,542	Continuing	Continuing

* Transferred to PE 64352N Surface Launched Weaponry Ship Systems for FY 1982 and subsequent years.

(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
	SCN (MK 86)	26,148	42,438	45,054	TBD	TBD	TBD
	(Quantity)	(2)	(3)	(3)	TBD	TBD	TBD
	OPN	18,825	57,800	11,700	34,500	Continuing	Continuing

Program Element: 64652N
DoD Mission Area: 231 - Anti-Air Warfare

Title: Gun System Improvement Program
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: MK 68 Fire Control System: Gun Fire Control System MK 68 improvements include development of upgraded components to enable the 5"/54 MK 42 gun mounts of Guided Missile Destroyers, Guided Missile Cruisers (Nuclear), and Frigates to more effectively engage present and future threats. This program includes digital upgrade of GFCS MK 68 which improves system reliability, maintainability, availability, performance, combat readiness and provides for software injection of ballistic data required for firing new fuzed projectiles including HIFRAG. Program also includes development of: capability expansion for naval gun fire support, multi-target capability, operational improvement and real time maintenance expansion. MK 86 Fire Control System: MK-86 Gun Fire Control System uses a track-while-scan radar for surface targets and monopulse radar for surface targets. It is installed on new/upgraded ships of destroyer size and larger. Besides providing fire control for guns, the system provides control for semi-active guided missiles on some ships. This project provides for improved capability to both surface and air tracking radars, Electro Magnetic Counter-Countermeasures Improvements, improved capability in clutter and jamming and other capabilities, and integration of SEAFIRE and the 5-inch Semi-Active Laser Guided Projectile.

(U) RELATED ACTIVITIES: PE64607N, Electro-Optical Sensor Development; PE64608N, Army/Navy Semi-Active Laser Guided Projectile, PE63609N, Surface Launched Munitions.

(U) WORK PERFORMED BY: Contractors: MK-68: Sperry, Great Neck, Long Island, NY; MK-86 Lockhead Electronics, Plainfield, N.J. In-House: Naval Ordnance Station Louisville, KY; Naval Surface Weapons Center, Dahlgren, VA.; Naval Surface Weapons Systems Engineering Station, Port Hueneme, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: MK 68 Fire Control System: Two MK 68 Digital Upgrade prototype systems developed and installed in USS BELKNAP (CG-26) and USS CHARLES F. ADAMS (DDG-2). Operational testing, evaluation and analysis completed. Approval for Service Use, with Operational Test and Evaluation Force and Naval Material Command recommendation has been requested. MK 86 Fire Control System: MK-86 Fire Control System has been service approved. A capability expansion (MK-86 MOD 3) has been completed. Initial work begun to integrate SEAFIRE electro-optical fire control system and 5" guided projectile. Development of an Optical Pulse Compression replacement for the AN/SPQ-9 surface radar, and development of an acquisition improvement for the AN/SPQ-60 air track radar.

2. (U) FY 1982 Program: MK 68 Fire Control System: Complete the MK 68 Digital Upgrade development effort. This includes: completion of software development test and certification of functional interfaces, completion of shipboard documentation package and production data package development; update engineering development model hardware. Documentation package includes Ordnance Publications for the upgraded system, Computer Set Control MK 167 and for Director MK 68 with solid state Amplifier MK 76.

Program Element: 64652N
Title: Gun System Improvement Program
DoD Mission Area: 231 - Anti-Air Warfare
Budget Activity: 4 - Tactical Program

Initiate development of naval gun fire support capability expansion and efforts for multi-target capability. MK-86 Gun Fire Control System: Complete 5-inch Guided Projectile integration. Continue SEAFIRE ordnance alterations developments. Continue improvements to the AN/SPQ-9 and AN/SPQ-60 radars. Continue Electro-Magnetic Counter-Countermeasures and Electronic Countermeasures improvements

3. (U) FY 1983 Program: MK-68 Fire Control System: Continue naval gun fire support capability expansion and development of multi-target capability. Initiate efforts for development of electronic counter countermeasure improvements and real time maintenance expansion. MK-86 Gun Fire Control System: Complete SPG-60 radar acquisition ordnance alteration and continue Electro-Magnetic Countermeasures ordnance alterations. Begin integration testing at the Land Based Test Facility, Wallops Island of guided missile and survivability improvements. Continue SEAFIRE ordnance alteration development. Initiate threat upgrade and modernization program.

4. (U) FY 1984 Planned Program: MK-68 Fire Control System: Continue development of naval gun fire support expansion, multi-target capability, electronic counter-countermeasures improvements and real time maintenance expansion modifications. MK-86 Fire Control System: Continue development of Electro-Magnetic Counter Countermeasures ordnance alterations for AN/SPG-60, AN/SPQ-9 radars and SEAFIRE. Continue development of the threat upgrade and modernization program, including expansion of capabilities for controlling SM-2 missiles.

5. (U) Program to Completion: MK-68 Fire Control System: Complete digital integration for FF-1052 Class ships. Complete development of system improvement modifications for improved operational availability (A) and combat effectiveness in assigned mission areas including naval gun fire support and surface warfare. Modifications provide radar reliability improvement, improved performance in electronic countermeasure environment, manning and weight reductions and track-while-scan (multi-target) capability. MK-86 Fire Control System: Complete development of alterations to correct system deficiencies and improve capability including Electro-Magnetic Counter Countermeasures and survivability improvements to the air and surface track radars. Complete SEAFIRE integration.

6. (U) Milestones:

Milestones (MK-68)	Date
1. Approval for Service Use of MK-68 Digital Upgrade	FY 1982
2. Initial Production MK 68 Digital Upgrade unit for DDG-2 Class	FY 1982
3. MK-68 Digital Upgrade Initial Operational Capability	FY 1984

Project: S0178
Program Element: 64652N
DoD Mission Area: 231 - Anti-Air Warfare

Title: MK-86 GUN FIRE CONTROL SYSTEM
Title: GUN SYSTEM IMPROVEMENT PROGRAM
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: This program consists of an improved lightweight digitally controlled gun weapon system development for new/upgraded ships of Destroyer and larger size. The MK 86 Gun Fire Control System uses track-while-scan radar for surface targets and monopulse doppler radar for air targets. Modifications of the system also provide control of semi-active radar guided missiles. Ongoing work involves replacing the MK 68 gun fire control system on six of the Guided Missile Destroyer 15/24 class ships with the MK 86 gun fire control system; the reconfiguring of weapons control consoles, and development of a capability expansion which provides increased computer capability to accommodate added systems capabilities, and AN/SPG-60 radar acquisition improvements. Work also involves: improvements to the AN/SPG-60 monopulse doppler radar to enhance performance in clutter and jamming; increased detection range of the AN/SPG-60 radar; improved Electro-Magnetic Counter-Counter-Measures and survivability capabilities for the AN/SPG-60 air track radar and AN/SPQ-9 surface track radar; SEAFIRE and 5-inch Semi-Active Laser Guided Projectile Integration; and Threat Upgrade and Modernization improvements, including expanded missile control capabilities.

(U) RELATED ACTIVITIES: PE 64304N, Aegis Combat System Engineering Development Site; PE 64607N, Electro-Optics Sensor Development; PE 64608N, Army/Navy Semi-Active Laser Guided Projectile.

(U) WORK PERFORMED BY: Contractors: Lockheed Electronics Company, Inc., Plainfield, NJ, is the major contractor. In-House: Naval Surface Weapons Center, Dahlgren laboratory, Dahlgren, Virginia; and Naval Surface Weapons Systems Engineering Station, Port Hueneme, California.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: MK 86 Gun Fire Control Systems service approved. Production systems installed in following ship classes: Guided Missile Destroyer (DDG-993), Destroyer (DD-963), Guided Missile Cruisers (CGN-36, 38), and Amphibious Assault Ship (LHA-1). Initiated development of a capability expansion which included an increased computer capability to accommodate added system capabilities. Completed capability expansion for MK 86 MOD 3. Awarded development contract for MK 86 gun fire control system modifications for DDG-15/24 class upgrade. Awarded the following contracts: Electro-Optics integration (Phase I); MK 86/Aegis combat system integration, 5" Semi-Active Laser Guided Projectile integration, development of an Optical Pulse Compression replacement for the AN/SPQ-9 surface search radar; and development of an acquisition improvement for the AN/SPG-60 air track radar. Conducted technical evaluation of MK 86 GFCS capability expansion and Guided Projectile integration ordnance alterations aboard USS BRISCOE (DD-977).

2. (U) FY 1982 Program: Continue development of AN/SPG-60 radar acquisition improvements. Complete 5" Semi-Active Laser Guided Projectile ordnance alteration. SEAFIRE integration ordnance alterations development and Electro-Magnetic Counter

Project: S0178
Program Element: 64652N
DoD Mission Area: 231 - Anti-Air Warfare

Title: MK-86 GUN FIRE CONTROL SYSTEM
Title: GUN SYSTEM IMPROVEMENT PROGRAM
Budget Activity: 4 - Tactical Program

Countermeasures improvements for both AN/SPG-60 and AN/SPQ-9 radars.

3. (U) FY 1983 Planned Program: Complete AN/SPG-60 radar acquisition ordnance alteration and continue Electro-Magnetic Counter Countermeasures improvement program for both AN/SPG-60 and AN/SPQ-9 radars, install new ordnance alterations and begin integration testing at the Land Based Test Facility at Wallops Island of guided missile and survivability improvements. Continue integration of ordnance alterations. Continue SEAFIRE integration ordnance alterations Initiate threat upgrade and modernization program, including expansion of capabilities for controlling STANDARD Missile-2 missiles.

4. (U) FY 1984 Planned Program: Continue development of Electro-Magnetic Counter Countermeasures ordnance alterations for both AN/SPG-60 and AN/SPQ-9 radars, SEAFIRE integration ordnance alterations and threat upgrade and modernization program, including expansion of capabilities for controlling SM-2 missiles.

5. (U) Program to Completion: Complete development of modifications to correct system deficiencies and improve capability, including Electro-Magnetic Counter Countermeasures and survivability improvements for the AN/SPQ-9 and AN/SPG-60 radar, integration ordnance development and threat upgrade and modernization program improvements. Complete SEAFIRE integration ordnance alterations.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0178	5,852	8,051	9,472	10,082	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64654N

Title: Joint Service Explosive Ordnance Disposal Development (Engineering)

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	2,248	2,477	2,926	3,805	Continuing	Continuing
S0377	Explosive Ordnance Disposal Procedures	2,248	2,477	2,537	2,502	Continuing	Continuing
S1594	Improvised Nuclear Device EOD Procedures	0	0	389	1,303	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for development of explosive ordnance disposal techniques for all known domestic and foreign ordnance and improvised nuclear devices. These techniques will be published for use by explosive ordnance disposal personnel of all services to perform their mission of rendering safe (disarming) and disposing of unexploded ordnance, including improvised nuclear devices. Department of Defense Directive 5160.62 of 24 November 1971 assigns development responsibility for explosive ordnance disposal procedures and equipment to the Department of the Navy.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project S0377, Explosive Ordnance Disposal Procedures: Continue development of explosive ordnance disposal procedures at a rate of about 100 new procedures and 350 technical updates of existing procedures per year. Project S1594, Improvised Nuclear Device EOD Procedures: Initiate a project to provide those specialized equipment and procedures required to counter improvised nuclear devices. 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 Project S0377, Explosive Ordnance Disposal Procedures, the decrease of 26 in FY 1981, 34 in FY 1982, and 79 in FY 1983 is due to refinement of estimates including an adjustment in inflation indices. Project S1594, Improvised Nuclear Device EOD Procedures, is a new start in FY 1983 and accounts for an increase of 389 in that year.

Progr: Elemen': 64654N

Title: Joint Service Explosive Ordnance Disposal Development (Engineering)

DoD Mission Area: 235 - Naval Warfare Support

Budget Activity: 4 - Tactical Programs

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

Project	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,200	2,274	2,511	2,616	Continuing	Continuing
S0377	Explosive Ordnance Disposal Procedures	2,200	2,274	2,511	2,616	Continuing	Continuing

(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
S0377	O&MN	986	98	237	87	Continuing	Continuing

Program Element: 64654N

Title: Joint Service Explosive Ordnance Disposal Development (Engineering)

DoD Mission Area: 235 - Naval Warfare Support

Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project S0377, Explosive Ordnance Disposal Procedures: Evaluate munitions and research existing technology to develop, validate and verify explosive ordnance disposal procedures and tools for use by explosive ordnance disposal personnel of all military services. There are an average of 700 joint service explosive ordnance disposal procedure developments ongoing at any one time. Schedules and priorities are established by the Explosive Ordnance Disposal Project Acceptance Board. This project also funds explosive ordnance disposal technical intelligence support. Project S1594, Improvised Nuclear Device EOD Procedures: Integrate the specialized equipment required to gain access to and disable/counter improvised nuclear devices into packages suitable for military explosive ordnance disosal teams and develop procedures for employment of these packages.

(U) RELATED ACTIVITIES: All ordnance related developments, both domestic and foreign.

(U) WORK PERFORMED BY: In-House: Naval Explosive Ordnance Disposal Technology Center, Indian Head, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0377, Explosive Ordnance Disposal Procedures: explosive ordnance disposal procedures were developed for all newly developed domestic ordnance. Continue to reduce backlog by developing render safe procedures for older domestic and foreign ordnance not previously covered by explosive ordnance disposal procedures.

2. (U) FY 1982 Program: Project S0377, Explosive Ordnance Disposal Procedures: Conduct engineering development studies on new domestic and foreign munitions and evaluate techniques and/or tools for accomplishing render safe procedures. Investigations involve research on the functioning of little known or undocumented munitions. The techniques for unknown foreign munitions often require development of new technical approaches, tools and equipment to provide countermeasures for sophisticated ordnance such as the terrain denial weapons now appearing the in munition inventories of various nations. Approximately 100 new joint service explosive ordnance disposal procedures and 50 technical updates of existing procedures will be provided for tactical field countermeasures use.

3. (U) FY 1983 Planned Program: Project S0377, Explosive Ordnance Disposal Procedures: Continue development of explosive ordnance disposal procedures in response to worldwide increases of new and more sophisticated military ordnance. As new weapon systems enter the domestic and foreign inventories, explosive ordnance disposal techniques, tools and equipment will be developed, validated and produced for use by the operational explosive ordnance disposal teams of all services. Project S1594, Improvised Nuclear Device EOD Procedures: A program will be initiated to develop procedures and specialized equipment required to gain access to and disable/counter improvised nuclear devices.

Program Element: 64654N

Title: Joint Service Explosive Ordnance Disposal Development (Engineering)

DoD Mission Area: 235 - Naval Warfare Support

Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Project S0377, Explosive Ordnance Disposal Procedures: Continue previous efforts. Project S1594, Improvised Nuclear Device EOD Procedures: Continue incremental build-up of capability to neutralize improvised nuclear devices.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64656M
Title: Marine Corps Assault Vehicles
DoD Mission Area. 211-Direct Fire Combat
Budget Area: 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	-	9,700	15,810	15,072	TBD	TBD
C1293	Lightweight High Horsepower Engine (Stratified Charge Rotary Combustion Engine, SCRCE)	*7,791	*9,700	15,810	15,072	TBD	TBD

* FY 1981 and FY 1982 funds for this project were contained in Program Element 63611M, Marine Corps Assault Vehicles.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides funds to develop a lightweight, high horsepower engine that will have the potential to satisfy a variety of military requirements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Program beyond FY 1982 will be based upon the FY 1982 effort which is to complete Advance Development Phase I, evaluate several engines offering high horsepower to weight ratios, including the Stratified Charge Rotary Combustion Engine and conduct MSARC I. The FY 1983 increase over FY 1982 (6,110) results from the need to purchase long lead time items for FY 1984 and 1985 deliverables, engine installation efforts in a vehicle and boat, and increase reliability 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: The Stratified Charge Rotary Combustion Engine was first funded separately as a project in FY 1981 subsequent to the submission of the FY 1981 Budget. The FY 1981 increase of 1803 was due to the need to fund open commitments and government liabilities and to restore FY 1980 funding reductions. Remaining portions of the increase were used for improved inspections and scheduling. The FY 1982 increase of 9700 (added by Congress) was to extend Advanced Development for the demonstration/validation phase during FY 1983. The FY 1983 and 1984 estimates of 15,810 and 15,072 respectively reflect definitization of estimates that were displayed TBD "To be Determined" on last year's Descriptive Summary.

Program Element: 64656M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Assault Vehicles
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	-	-	-	TBD	TBD	TBD
C1293	Stratified Charge Rotary Combustion Engine		5,968*	-	TBD	TBD	TBD

* FY 1980 and FY 1981 funds for this project were contained in PE 63611M, Marine Corps Assault Vehicles.

Program Element: 64656M
Title: Marine Corps Assault Vehicles
DoD Mission Area: 211-Direct Fire Combat
Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The rotary engine is being developed as a possible power source for the Landing Vehicle Tracked (Experimental) and/or the Mobile Protected Gun System. Characterized by its high horsepower-to-weight ratio, the rotary engine may permit reductions in vehicle weight and silhouette that improve vehicle agility, mobility, and survivability. In addition to its high horsepower-to-weight ratio, the rotary engine has other important advantages including simplicity in design, multi-fuel capability, excellent unaided cold weather startability, low emissions, low vibrations and low magnetic signature. The rotary engine has various other potential applications as a power source for other wheeled and tracked vehicles, small naval craft, and electric power generators.

(U) RELATED ACTIVITIES: Landing Vehicle Tracked (Experimental) and Mobile Protected Gun System.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA; Naval Sea Systems Command, Washington, DC; Naval Ship Systems Engineering Station, Philadelphia, PA. Contractors: Curtiss-Wright Corporation, Wood-Ridge, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 AND Prior Accomplishments: In FY 1977 a contract under the Landing Vehicle Assault Project, C0020, PE 63611M, Marine Corps Asault Vehicles, was awarded to Curtiss-Wright for the advanced development of a four-rotor, high horsepower to weight ratio, stratified charge rotary combustion engine. Advanced development of the rotary engine proceeded under the Landing Vehicle Tracked (Experimental) project, and a full power demonstration was achieved 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 and advanced development of the RC2-350 engine was initiated. The rotary engine contract with Curtiss-Wright Corporation for the design, development and fabrication of seven two-rotor engines was awarded on 5 September 1980. Phase I of Advanced Development of the two-rotor engine is presently underway.

2. (U) FY 1982 Program: Lightweight High Horsepower Engine (SCRCE): Advanced Development Phase I for the two-rotor engine will be concluded with the delivery of seven engines for testing and evaluation. Evaluate alternative engines to satisfy the need for a high horsepower, lighweight engine. Commence vehicle and boat installation efforts for engine testing and evaluation.

3. (U) FY 1983 Planned Program: Lightweight High Horsepower Engine (SCRCE): Commence demonstration/validation phase of development. Continue vehicle and boat demonstration efforts. Conduct reliability testing and purchase Long Lead Time Items for FY 1984 - 1985 deliverables. Conduct MSARC I. The FY 1983 increase over FY 1982 (6,110) results from the need to purchase long lead time items for FY 1984 and 1985 deliverables, engine installation efforts in a vehicle and boat, and increase reliability testing.

Program Element: 64656M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Assault Vehicles
Budget Area: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Lightweight High Horsepower Engine (SCRCE): Continue demonstration/validation testing. Recieve eight deliverable engines for use by LVT(X) demonstration/validation contractors in prototype vehicles.

5. (U) Program to Completion: Lightweight High Horsepower Engine (SCRCE): To be determined. Complete demonstration/validation phase, conduct MSARC II and III, enter Full Scale Engineering Development.

6. (U) Milestones:

Stratified Charge Rotary Combustion Engine:	Date
1. Two rotor engine contract award.	Sep 1980
2. Complete study of several optional engines offering high horsepower to weight ratios.	Feb 1982
3. Receive seven engines for testing and evaluation.	Jun 1982
4. Conduct MSARC I.	1stQtr FY 1983

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64657M
Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
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 Etimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	18,236	23,377	10,724	16,616**	TBD	TBD
C0010	Shoulder-Launched Multipurpose Assault Weapon (SMAW)	8,633	19,191	995	4,443	TBD	TBD
C0018	Artillery Computer System (ACS)	-	-	1,939	658*	TBD	TBD
C0021	Landing Vehicle Tracked (LVT7A1) Program	7,206	2,012	3,154	2,848*	TBD	TBD
C0027	Modular Universal Laser Equipment (MULE)	2,068	662	-	-	-	20,562
C0080	Mine and Booby Trap Countermeasures Engineering	250	212	1,988	1,975	TBD	TBD
C1073	Universal Infantry Weapons Trainer (UIWT)	5	-	-	-	TBD	TBD
C1119	Infantry Mortar Programs	74	551	541	691	Continuing	Continuing
C1443	Training Devices and Simulators (Engineering)	-	198	2,107	662	TBD	TBD

* Funded in Program Element 26623M, Ground Combat/Supporting Arms (Operational Systems)
** Non additive: FY 1984 funds of 3,060 for C0008, Eight Inch Laser Homing Ordnance; 5,212 in FY 1984 and 551 in FY 1982 for C1294, Field Artillery Rocket System; and 573 in FY 1984 for C1295, Artillery Direct Fire Sight are transitioning from Program Element 63635M, Ground Combat/Supporting Arms Systems (Advanced) where they are funded in FY 1983.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides for the engineering development of Marine Corps equipment and systems for the conduct of close combat and fire support.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To continue development, testing and evaluation of systems as listed above to increase close combat and fire support capabilities of the Marine Corps. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
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: The cost growth in the Landing Vehicle Tracked (LVT-7A1) Program in FY 1981 (+3,155) resulted from contractor rate increase in operating costs, subcontractor and vendor increases, unanticipated refurbishment of government furnished equipment, increased cost of materials and inherent uncertainties in the development effort. FY 1983 and FY 1984 estimates for the following programs reflect definitization of estimates which were displayed as TBD "To Be Determined" on last year's Descriptive Summary: Shoulder Launched Multipurpose Assault Weapon 995 in FY 1983 and 4,443 in FY 1984; Landing Vehicle Tracked (LVT7A1) Program 3,154 in FY 1983 and 2,848 in FY 1984; Mine and Boobytrap Countermeasures Engineering 1,988 in FY 1983 and 1,975 in FY 1984; Infantry Mortar Programs 541 in FY 1983 and 691 in FY 1984; Training Devices and Simulators (Engineering) 2,107 in FY 1983 and 662 in FY 1984. All other changes are due to refinements in program 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 Etimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8,947**	13,975	2	TBD	TBD	TBD
C0010	Shoulder-Launched Multipurpose Assault Weapon	684*	8,335	19,215	TBD	TBD	TBD
C0018	Battery Computer System	2	-	-	TBD	TBD	TBD
C0021	Landing Vehicle Tracked (LVT7A1) Program	5,885	4,051	2,013	TBD	TBD	TBD
C0027	Modular Universal Laser Equipment	2,543	1,060	662	TBD	TBD	TBD
C0080	Mine and Boobytrap Countermeasures Engineering	393	4	212	TBD	TBD	TBD
C1073	Universal Infantry Weapons Trainer	120	322	-	TBD	TBD	TBD
C1119	Infantry Mortar Programs	3	203	551	TBD	TBD	TBD
C1294	Field Artillery Rocket System	-	-	551	TBD	TBD	TBD
C1443	Training Devices and Simulators	-	-	198	TBD	TBD	TBD

* Funded in PE 63635: Ground Combat/Supporting Arms Systems
** FY 1980 Column not additive due to FY 1980 program restructure.

Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) OTHER APPROPRIATION FUNDS:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Etimate	Additional to Completion	Total Estimated Cost
	PMC						
C0018	Artillery Computer System				12,354	22,075	34,429
	(Quantity)				(161)	(261)	(422)
C0021	Landing Vehicle Tracked (LVT7) Program						
	(SLEP)	40,091	175,655	157,240	106,482	TBD	TBD
	(Quantity)	(25)	(378)	(363)	(219)	TBD	
	(New Procurement)	12,000	57,297	151,513	163,464	10,100	TBD
	(Quantity)		(30)	(168)	(171)	(9)	
C1119	Infantry Mortar Programs						
	81mm Mortar Launch Tube			-	2,400	30,119	32,519
	(Quantity)				(77)	(896)	(973)
	Projectile, 81mm Mortar (Training)					TBD	TPD
	(Quantity)						
C0027	Modular Universal Laser Equipment	-	21,200	47,814	16,779	23,161	108,954
	(Quantity)	-	(40)	(120)	(120)	(100)	(389)
C1443	Training Devices and Simulators			479	101	6,610	7,190
				(299)	(40)		

Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Shoulder-Launched Multipurpose Assault Weapon: To provide a man-portable assault weapon to destroy fortified positions, bunker defenses and light armored vehicles and provide a breaching capability in Military Operations in Built-up Areas/Military Operations in Urban Terrain warfare. Artillery Computer System: This program was formerly known as the Battery Computer System (BCS). The Marine Corps terminated participation with the U.S. Army in the Battery Computer System in August, 1979 and commenced development of the Artillery Computer System which better satisfied Marine Corps requirements. Project plans are to build on U.S. Army developments to the maximum extent feasibile to minimize risks, costs and development time. The Artillery Computer System will provide ballistic computations and application of non-standard ballistic data for individual weapons at the artillery battery level. Landing Vehicle Tracked Program: This program is intended to provide the Marine Corps with a continuous surface amphibious assault capability during the interim years between the scheduled termination of the service life of the current Landing Vehicle Tracked (LVT7) vehicles (1982) and the earliest predicted initial operational capability of the planned follow-on assault amphibious vehicle in the 1990's. The Landing Vehicle Tracked program will extend the life of the current Landing Vehicle Tracked and improve its capability with a new engine and certain designated product improvement subsystems and components to include an all electric weapons station, secure voice communications system, night vision driving devices, non-integral fuel cells and troop compartment ventilation. Modular Universal Laser Equipment: To provide a man-packed laser designator and rangefinder module that will provide the capability for accurate target location for conventional air and artillery munitions and designation of targets for laser guided projectiles. Infantry Mortar Program: This program provides specific Marine Corps technical and managerial requirements for the Improved 81mm Mortar (I-81) and Improved Family of Mortar Ammunition. Mine and Boobytrap Countermeasures: To provide a capability to breach minefields in the amphibious assault from the Landing Vehicle Tracked Personnel 7A1 Assault Amphibian Tractor. Training Devices and Simulators: Provides for the Universal Infantry Weapons Trainer which allows infantrymen to simulate field firing with the full family of infantry weapons and for the Manual Wargame Based Tactical Training System which allows Commanders and their staffs to practice the tactical decisions they would have to make in combat.

(U) RELATED ACTIVITIES: Artillery Computer System: This program is related to the Marine Integrated Fire and Air Suppport System (MIFASS). Landing Vehicle Tracked (LVT7A1) Program: This vehicle is related to the Landing Vehicle Tracked (Experimental), a Marine Corps planned follow-on amphibious assault vehicle. Modular Universal Laser Equipment: Related to the Army's Ground Laser Locator Designator in technology and in the commonality of some of the components. Infantry Mortar Program: This program is a joint U.S. Army/Marine Corps effort. Mine and Boobytrap Countermeasures: Related to the Landing Vehicle Tracked program in that it is intended to provide assault amphibian vehicles with a mine field breaching capability.

Program Element: 64657M
Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
DoD Mission Area: 211-Direct Fire Combat
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: Shoulder-Launched Multipurpose Assault Weapon: Contractor: None. In-House: Naval Surface Weapons Center, Dahlgren, VA. Artillery Computer System: Contractor: Magnavox, Ft Wayne, IN. In-House: PM TacFire, Ft. Monmouth, NJ. Landing Vehicle Tracked: Contractor: FMC Corp., San Jose, CA. In-House: Naval Sea Systems Command, Washington, DC. Modular Universal Laser Equipment: Contractor: Hughes Aircraft, Culver City, CA; Sperry Gyroscope, Great Neck, NY. In-House: Missile Research and Development Command, Redstone Arsenal, AL, and Naval Weapons Center, China Lake, CA. Infantry Mortar Program: Contractor: None. In-House: U.S. Army Armament Research and Development Command, Dover, NJ. Universal Infantry Weapons Trainer and Traning Devices and Simulators: Contractor: None. In-House: Naval Training Equipment Center, Orlando, FL. Mine and Boobytrap Countermeasures: Contractor: FMC Corp., San Jose, CA. In-House: Naval Sea Systems Command, Washington, DC.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Shoulder-Launched Multipurpose Assault Weapon: Completed Advanced Development. Prepared a Request for Proposal (RFP) for industry to merge Marine Corps' Shoulder-Launched Multipurpose Assault Weapon (SMAW) warhead to a fielded launcher/propulsion system. Artillery Computer System: This program was initiated in August 1980 following termination of Marine Corps participation in the Battery Computer System. An Acquisition Decision Memorandum (ADM) for program initiation at Milestone I has been approved. Landing Vehicle Tracked: The Marine Corps Systems Acquisition Review Council was conducted in April 1976 and the Development Contract Procurement Request was approved in June 1976. The Development Contract Request for Proposal was issued in September 1976. FY 1977: The Development Contract was awarded in April 1977 and the delivery of three rebuilt Landing Vehicle Tracked Personnel and all Government Furnished Material/Government Furnished Equipment was completed in September 1977. FY 1978: The Development Contract was modified for the Landing Vehicle Tracked Command and the Landing Vehicle Tracked Recovery, the Procurement Request was approved and the In Progress Review (Configuration Review) was completed in September 1978. Eleven rebuilt Landing Vehicle Tracked Personnel, one Landing Vehicle Tracked Command and one Landing Vehicle Tracked Recovery were delivered in March 1978 to the contractor. FY 1979: The first increment of Landing Vehicle Tracked (personnel, recovery and communication) vehicles was delivered to the Marine Corps for development/Operational Testing. FY 1980: Delivery of vehicles for development/operational testing was completed and operational testing was initiated. FY 1981: Developmental Test/Operational Test II was completed and Marine Systems Acquisition Review council III approved the Landing Vehicle Tracked 7A1 for service use and authorized production contract negotiations. Modular Universal Laser Equipment: Feasibility models were received and tested and evaluation was conducted during FY 1975: In-Progress Review II was conducted during FY 1977 and a contract for engineering development was awarded. Following completion of brassboard testing in FY 1977, Phase II of engineering development commenced. Development Test II was completed in FY 1980. Additional tasks to insure a smooth transition to the production phase were initiated. These included providing special acceptance and test equipment for production facilities. Operational Test II was completed. Completed Modular Universal Laser Equipment/Digital Communications Terminal interface design. Universal Infantry Weapons Trainer: Advanced Development prototype in M16 rifle mode was made operational at the Naval Training Equipment Center. Infantry Mortar Program: Continued joint effort with Army on the Improved 81 Mortar and its ammunition. Mine and Boobytrap Countermeasures:

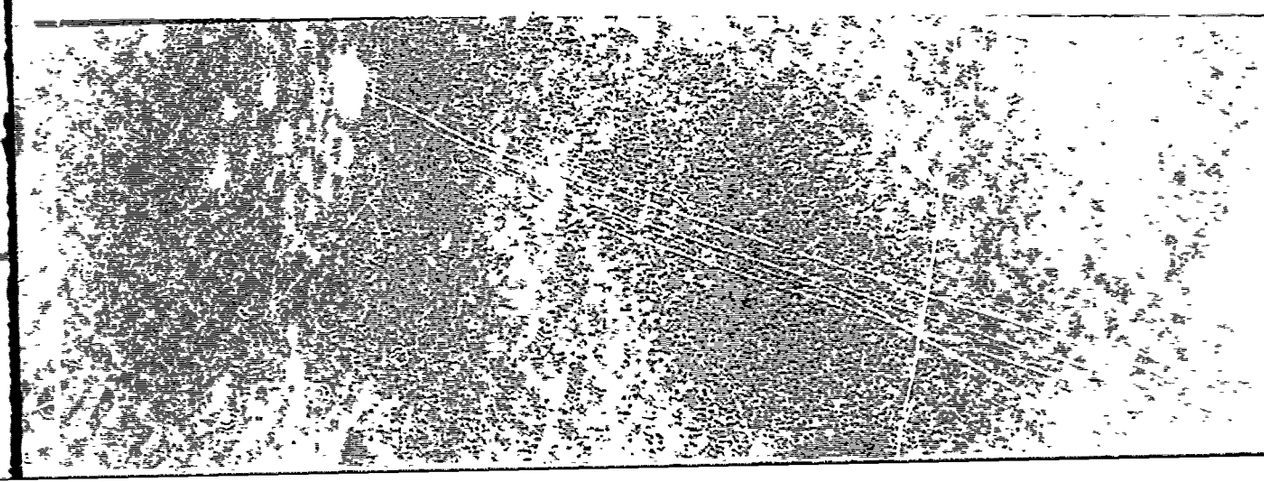
Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

The Landing Vehicle Tracked Personnel 7A1 Assault Amphibian Tractor Minefield Breaching Kit completed Engineering Development. The M-58 line charge was evaluated in test firings. Training Devices and Simulators: Prototype for the company wargame was completed.

2. (U) FY 1982 Program: Shoulder-Launched Multipurpose Assault Weapon: Released Request for Proposal to Industry in FY 1982. A Marine Systems Acquisition Review Council II decision on the Shoulder-Launched Multipurpose Assault Weapon is scheduled for FY 1982. At that time the Marine Corps will determine which contractor will merge the Marine Corps' warhead to industry's fielded launcher/propulsion system. Contract award is scheduled for May 1982. Artillery Computer System: Award contract for development of "A" Level specifications. Conduct In-Progress Review II. Commence development of software package. Landing Vehicle Tracked Program: Revise the detailed test plan and publish Developmental Test Plan III. Monitor the production of the Landing Vehicle Tracked 7A1 (both the Service Life Extension Program vehicles and new production). Monitor and coordinate the flow of vehicles from the operational units to the contractor. Conduct Developmental Test/Operational Test III. Modular Universal Laser Equipment: Complete engineering development contracts. Initiate hardware improvements made as a result of Operational Test II. Retrofitting of the encoder in the Modular Universal Laser Equipment will be completed. Complete the technical data package. Marine Systems Acquisition Review Council III will be conducted. A Request for Proposal will be issued and a production contract will be awarded. Production will commence late in FY 1982. Mine and Boobytrap Countermeasures: Completion of Landing Vehicle Tracked Minefield Breaching Kit prototype and Approval for Service Use. Infantry Mortar Program: Continue joint program with the U.S. Army for fielding the Improved 81mm Mortar and its ammunition. Continue development of the 60mm illumination and practice projectiles. Training Devices and Simulators: Commence engineering development on the Universal Infantry Weapons Trainer.

3. (U) FY 1983 Planned Program: Shoulder-Launched Multipurpose Assault Weapon: Complete merger of the Marine Corps's Shoulder-Launched Multipurpose Assault Weapon (SMAW) warhead to a fielded launcher/propulsion system. Continue development of additional warheads. Artillery Computer System: Complete software package. Conduct Developmental Test/Operational Test II during 2nd and 3rd quarters. Conduct In-Progress Review III. Landing Vehicle Tracked-7A1 Program: Delivery of Government Furnished Material/Government Furnished Equipment will be accomplished. First production article will be delivered for testing and evaluation to an Assault Amphibian Battalion. Modular Universal Laser Equipment: Continue production of the system. Infantry Mortar Program: Continuation of testing of Improved-81 Mortar with the U.S. Army. Mine and Boobytrap Countermeasures: LVTP7 Assault Amphibian Tractor and M58 Trailer Mounted Minefield Breaching Kits will be fielded. Efforts on an alternative delivery means will be continued. Training Devices and Simulators: Company, Battalion, and Marine Amphibious Force combined arms manual wargames will enter into Engineering Development and complete testing. Continue work on the Engineering Development Model of the Universal Infantry Weapons Trainer.



Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Shoulder-Launched Multipurpose Assault Weapon: Continue development of additional warheads for this system. Artillery Computer System: Issue Request for Proposal and award production contract. Landing Vehicle Tracked-7A1: Continue the introduction of the Landing Vehicle Tracked 7A1 and the fielding of the vehicles to the Fleet Marine Force. Modular Universal Laser Equipment: Continue full scale production. Initial Operational Capability is 3rd quarter of FY. Infantry Mortar Program: Continue monitoring Army mortar systems. Continue joint developmet of 81mm family of mortar projectiles. Mine and Boobytrap Countermeasures: Completion of development and transition to Advanced Development of other Mine and Boobytrap programs into this Program Element. Training Devices and Simulators: Complete development of the Landing Force Manual Wargame. Continue development of combined arms and advanced occupational specialty games. Continue development of additional weapons modules for the Universal Infantry Weapons Trainer.

5. (U) Program to Completion: Shoulder-Launched Multipurpose Assault Weapon: Continuation of development of additional warheads for the Shoulder-Launched Multipurpose Assault Weapon Launcher. Landing Vehicle Tracked Program: Montior field use for operational deficiencies requiring product improvement. Delivery of Government Furnished Material/Equipment will be continued until conversion to the Landing Vehicle Tracked 7A1 is completed. Delivery of vehicles to the Amphibious Assault Battalions, Prepositioned War Reserves and to the Marine Corps will be completed. Introduction of the Modular Universal Laser Equipment, Universal Infantry Weapons Trainer, Landing Vehicle Tracked, Minefield Breaching Kit and training wargames into the Fleet Marine Force. Mine and Boobytrap programs will be continued. Infantry Mortar Program: Continue monitoring Army Mortar programs.

Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone	Date
Shoulder-Launched Multipurpose Assault Weapon	
1. Milestone II	FY 1982
2. Milestone III	FY 1983
3. Initial Operational Capability	FY 1984
I-81mm Mortar-Initial Operational Capability	FY 1986
Landing Vehicle Tracked-7A1	
1. Developmental Test/Operational Test completed	FY 1981
2. Marine Systems Acquisition Review Council III	FY 1981
3. Approval for Service Use	FY 1981
4. Award Production Contract	FY 1982
5. Developmental Test/Operational Test III	FY 1982
6. Initial Operational Capability	FY 1984
Modular Universal Laser Equipment	
1. Marine Systems Acquisition Review Council II	FY 1976
2. Development Test II	FY 1980
3. Operational Test II	FY 1981
4. Marine Systems Acquisition Review Council III	FY 1982
5. Issue Request for Proposal	FY 1982
6. Award Production Contract/	
7. Commence Production	FY 1982
8. Initial Operational Capability	FY 1984
Artillery Computer System	
1. Milestone I Acquisition Decision Memorandum	FY 1981
2. In-Progress Review II	FY 1982
3. Developmental Test/Operational Test II	FY 1983
4. In-Progress Review III	FY 1983
5. Production Contract Award	FY 1984
6. Initial Operational Capability	FY 1985

Project: C0010
Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Shoulder Launched Multipurpose Assault Weapon
Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Shoulder-Launched Multipurpose Assault Weapon is a lightweight, manportable assault weapon which will be employed on the battlefield against bunkers, masonry strongpoints and lightly armored vehicles. Presently, there is no weapon in our inventory to accomplish these tasks efficiently. As presently envisioned, it will be a 81mm free flight rocket which uses a dual mode fuze warhead and will be fired from a reuseable launcher.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: Naval Surface Weapons Center, Dahlgren, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In FY 1981, the Marine Corps completed advanced development of its dual mode fuze Shoulder-Launched Multipurpose Assault Weapon warhead. Additionally, it was decided that the fielding of this system could be accelerated by merger of this warhead to a fielded, reuseable launcher/propulsion system. As the result of this decision, a Request for Proposal (RFP) was prepared.

2. (U) FY 1982 Program: The Request for Proposal (RFP) to merge the Marine Corps' Shoulder-Launched Multipurpose Assault Weapon wachead to a fielded, reuseable launcher/propulsion system was released to Industry on 18 November 1981. Industry's responses are due in January 1982. A Milestone II decision will determine the system to be taken into an accelereated Full Scale Engineering Development phase and this contract will be awarded in May 1982.

3. (U) FY 1983 Planned Program: During FY 1983, the Marine Corps will complete the Full Scale Engineering Development of the Shoulder-Launched Multipurpose Assault Weapon and will award the production contract as the result of the Milestone III decision. Additionally, development will commence on additional warheads (antitank, smoke and flame) which will be able to be fired from this same reuseable launcher.

4. (U) FY 1984 Planned Program: Development will continue on a family of warheads to be fired from the reuseable Shoulder-Launched Multipurpose Assault Weapon launcher.

5. (U) Program to Completion: Continuation of development of family of warheads for the Shoulder-Launched Multipurpose Assault Weapon launcher.

Project: C0010
Program Element: 64657M
DoD Mission Area: 211-Direct Fire Combat

Title: Shoulder-Launched Multipurpose Assault Weapon
Title: Marine Corps Ground Combat/Supporting Arms Systems (Engineering)
Budget Activity: 4 - Tactical Programs

6. (U) Milestones:

Milestone	Date
1. Milestone II	FY 1982
2. Milestone III	FY 1983
3. Initial Operational Capability	FY 1984

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0010	Shoulder-Launched Multipurpose Assault Weapon	8,633	19,191	995	4,443	TBD	TBD

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64675N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capability (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	0	0	166,271	111,483	31,414	378,460
S0366	MK 48 Advanced Capabilities (Engineering)	(6,800)1/	(62,492)1/	166,271	111,483	31,414	378,460 1/
	(Quantity - Engineering Development Torpedo Modifications)		(40)2/				(40)2/
	(Quantity - Engineering Development Model Automated Test Equipment)		(3)2/				(3)2/

1/ Funded in Program Element 64562N (Submarine Tactical Warfare Systems (Engineering)) in FY 1982 and Prior Years. Total cost estimate applies to the engineering development program (Program Elements 64562N and 64675N) only.
2/ Development/Operational Test and Evaluation.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element accomplishes design, engineering development, test and evaluation of the submarine launched MK 48 Advanced Capabilities torpedo to counter the Soviet threat in the 1985-2000 timeframe.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Refine Advanced Capability design and formfit functions including [redacted] Initiate fire control modification into engineering development configurations. Continue work in Torpedo Advanced Development Program Element 63691N, project S0311. Begin production of engineering development model torpedoes and fabrication of upgraded fuel tanks and propulsion hardware. Integrate and test prototype fire control modifications.

(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 (amended) FY 1982 Descriptive Summary, for project S0366 of Program Element 64562N (Submarine Tactical Warfare Systems (Engineering)). Refer to the Descriptive Summary for Program Element 64562N for FY 1981 and 1982 funding changes. This Descriptive Summary provides estimates for the FY 1983 planned program and the total cost of Full Scale Engineering Development, as shown. Program restructuring has reduced some of the overlap in the advanced development and engineering development phases, revising the Initial Operating Capability [redacted]
The total estimated cost of the Weapons Procurement, Navy program is subject to a detailed analysis which is in progress and has therefore been shown as "to be determined".

Program Element: 64675N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capability (Engineering)
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
Weapons Procurement Navy						
MK 48 Advanced Capabilities Torpedoes	0	0	0	115,700	*	*

* To Be Determined

Program Element: 64675N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capability (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Predicted advances in Soviet submarine design and capability will reduce the effectiveness of the fleet MK 48 torpedo[. The use[

] It is feasible to regain the lost performance with the Advanced Capability, MK 48 Torpedo by use of digital processing and multiple beams possible now with improved components and technology and improvements in the propulsion and fuel tank subsystem.

(U) RELATED ACTIVITIES: Concurrent advanced development of the MK 48 Advanced Capabilities torpedo (project S0311) began in Program Element 63562N (Submarine Tactical Warfare Systems (Advanced)) and will transfer to Program Element 63691N (MK 48 Advanced Capabilities Torpedo) in FY 1983, its final year of funding. This project is funded in Program Element 64562N (Submarine Tactical Warfare Systems (Engineering)) in FY 1981 and 1982.

(U) WORK PERFORMED BY: In-House: Naval Undersea Warfare Engineering Station, Keyport, WA. Contractors: Gould Inc., Cleveland, OH; Hughes Aircraft, Fullerton, CA (prime contractor MK 48 Advanced Capabilities Torpedo); Applied Research Laboratory, Penn State University, State College, PA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This is an FY 1983 new start. Prior work was funded in Program Element 64562N (Submarine Tactical Warfare Systems (Engineering)).

2. (U) FY 1982 Program: This is an FY 1983 start. The project was funded in Program Element 64562N (Submarine Tactical Warfare Systems (Engineering)) in FY 1982.

3. (U) FY 1983 Planned Program: Refine advanced capability design and formfit functions. Initiate fire control modifications into engineering development configurations. Continue refinement of advanced capability design and formfit functions, including propulsion and fuel subsystem upgrade. Begin production of engineering development model torpedoes and fabrication of upgraded fuel tanks and propulsion hardware. Integrate and test prototype fire control modifications. Advanced development contiues in Program Element 63691N, project S0311.

4. (U) FY 1984 Planned Program: Begin delivery and in-water testing of engineering development model torpedoes. Refine software design. Conduct test firings with modified fire control system. Prepare specification for the limited production of MK 48 advanced capability warshot torpedoes and support equipment. Award Limited Production Plan contract with prime contractor to fabricate sixty-six MK 48 advanced capability torpedoes and support equipment.

Program Element: 64675N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: MK 48 Advanced Capability (Engineering)
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: Conduct Technical and Operational Evaluation of engineering development model torpedoes. Obtain approval for service use. Analyze test results and finalize documentation for Milestone III. Begin production and test of fire control modifications. Prepare specifications for full production of MK 48 Advanced Capabiliy torpedoes and support equipment. Award full production contract to prime contractor to fabricate MK 48 Advanced Capability torpedoes. Complete follow-on Test and Evaluation of engineering development model torpedoes.

6. (U) Milestones

Milestone		Date
a. Award Advanced Capabilities Engineering Development Model Contract	(March 1981)*	Jan 1982
b. First Engineering Development Model torpedo delivery	(April 1983)*	Jun 1984
c. Start Engineering Development Model torpedo in-water tests	(May 1983)*	Jul 1984
d. Complete Engineering Development Model torpedo test and evaluation	(July 1984)*	Oct 1985
e. Department of the Navy Systems Acquisition Review Council Milestone III		
f. Approval for Service Use		

* Dates shown in FY 1982 Descriptive Summary. Changes in milestone dates are due to restructuring of the MK 48 Advanced Capability for an Initial Operating Capability of approximately 1 year later than planned in the FY 1982 Program Element Descriptive Summaries. Milestone 6e reflects Deparment of the Navy (vice Department of Defense) decision authority.

Program Element: 64675N
DoD Mission Area: 233-Anti-Submarine Warfare

Title: MK 48 Advanced Capabilities (Engineering))
Budget Activity: 4 - Tactical Programs

(U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: Torpedo MK 48 Advanced Capability Engineering Development Test and Evaluation will be conducted commencing with the 3rd Quarter, FY 1983. A formal Technical Evaluation will be conducted during FY 1984. In-water runs will include deployment in the presence of countermeasures, for both surface ship and submarine. Development Test and Evaluation/Technical Evaluation will continue through the 2nd Quarter, FY 1984. Laboratory and simulation tests will continue at Navy laboratories and contractor facilities to further evaluate the Advanced Capabilities concept, design and packaging. All in-water torpedo runs will be used to develop the data base needed to demonstrate the Test and Evaluation Master Plan specified material reliability and mean turnaround time. All Advanced Capability modified torpedoes used for Engineering Development Phase in-water testing will have the same form and fit factors as those units to be procured in production. Testing is being designed to evaluate all major mission variations with data base expansion through simulation. All major support systems are being evaluated.

2. (U) Operational Test and Evaluation: Test and Evaluation will be conducted in three basic phases. Validation Phase (Operational Test-I), Full Scale Development Phase (Operational Test - II) and Test and Evaluation after Milestone III (Operational Test III). The Secretary of the Navy has directed an accelerated development program, and has approved a schedule with a period of concurrent advanced and engineering development prior to the completion of validation phase testing plus a limited production prior to Department of the Navy System Acquisition Review Council III approval. This approach will use the test and evaluation results from various sources to support the decision to proceed with:

Engineering Development Model long lead item procurement
Engineering Development Model fabrication
Limited production long lead item procurement
Limited production
Full production long lead item procurement

The Secretariat has waived Department of the Navy Systems Acquisition Review Council II; however the Department of the Navy Systems Acquisition Review Council III decision will be required prior to full production. Program reviews will be conducted at the above Program Manager decision points to enable the Program Manager to keep the Assistant Secretary of the Navy (Research, Engineering and Systems) appraised of the program's status.

Program Element: 64675N
DoD Mission Area: 233-Anti-Submarine Warfare

Title: MK 48 Advanced Capabilities (Engineering))
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a. (U) Validation Phase Test and Evaluation: Test and Evaluation to be conducted during validation phase is designed to verify the elimination or reduction to low risk of several MK 48 Advanced Capability technology issues: Embedded computer software development, transducer[ ], alternator, [ ] and electronic circuit size constraints. During the validation phase, test results from conceptual system tests, brassboard components and system tests, and early Advanced Development Model component and brassboard functional unit tests will be used by the program manager to authorize Engineering Development Model long lead procurement. Further Advanced Development Model component and brassboard functional unit tests plus Advanced Development Model weapon contractor tests will provide data necessary for the Program Manager to authorize Engineering Development Model fabrication. Validation phase tests will assess the performance of the torpedo in general as well as the specific performance of various torpedo subsystems. Tests will be conducted in selected environments during Development Test and Evaluation, e.g., (1) high sea states, shallow water, and other adverse environments as well as good environments; (2) in attacking evading real targets[ ] (3) in attacking an artificial target or a real[ ] submarine; and (4) in launches against surface and subsurface targets[ ], without presenting an unwarranted hazard. Measurements will be made to verify that the radiated noise of the Advanced Capabilities modified weapon is[ ] and that during higher speed periods[ ].

(U) All Development Test - I laboratory, simulation, and in-water test results plus any dedicated Operational Test - I test results will be considered in the determination of the MK 48 Advanced Capability Torpedo's demonstrated ability to meet the validation phase operational effectiveness and suitability thresholds. Dedicated Operational Test and Evaluation test events with Advanced Development Models may be required in addition to Development Test - I tests.

(U) During the period from the completion of validation phase testing to the availability of Engineering Development Model torpedoes (approximately 12 months), testing will continue with Advanced Development Model torpedoes. Advanced Development Model torpedoes will be exercised in areas not fully evaluated previously, including evading targets, shallow-water performance in the Gulf of Maine, tactical logic, and weapon/fire control interfacing and operability. Approximately 120 runs are planned during this continued Advanced Development Model testing phase.

b. (U) Full Scale Development Phase Test and Evaluation: To support Milestone III, an independent Operational Evaluation will be conducted. Over a five month period, time will be allotted to torpedo preparation, transit, firing, exercise reconstruction, analysis, and preparation of a report and a recommendation regarding Approval for Service Use and full production. At-sea testing will be conducted on 3-Dimensional ranges and in an open ocean environment. Presently there is no single artificial target available which is capable of operationally testing the Advanced Capability Torpedo to its designed limitations. Operational testing without an improved target will result in piecemeal evaluation using many available targets to test to the weapon's

full capabilities, thus possibly increasing the total number of Operational Evaluation runs required. In-water Operational Evaluation tests will be used to further validate the Naval Ocean Systems Center Hybrid Simulation Model. With the validated model, simulation runs will be conducted to determine effectiveness of the MK 48 Advanced Capabilities Torpedo against real threat target types in varying ocean areas utilizing known threat target tactics.

c. (U) Test and Evaluation After Milestone III: Follow-On Operational Test and Evaluation will be conducted and consist of Operational Test - III and Operational Test - IV. Operational Test - III objectives will include evaluation of performance that was deferred or incomplete during Operational Evaluation and verification of corrections for problems observed during Operational Evaluation. In-water tests using Engineering Development Models are required to complete this effort. Operational Test - IV will assess the torpedoes' performance in additional environments and against new threats. Production units, as available, should be used for this testing.

3. (U) System Characteristics: The system Development Test and Evaluation performance characteristics are contained in Table I-1. The system Operational Test and Evaluation performance characteristics are contained in Table I-2.

Table I-1

DEVELOPMENT TEST AND EVALUATION PERFORMANCE CHARACTERISTICS

	Validation Phase		Full Scale Development Phase		Post-Milestone III
PARAMETER	THRESHOLD	DEMONSTRATED	THRESHOLD	DEMONSTRATED	GOAL
Weapon Performance					
Active Acquisition Range 1/ (yards/(meters))					
Target Strength (decibels) Doppler (knots)					
Passive Acquisition Range 1/ (yards/(meters))					
Countermeasures effectiveness (percent)2/					

Program Element: 64675N
DoD Mission Area: 233-Anti-Submarine Warfare

Title: MK 48 Advanced Capabilities (Engineering))
Budget Activity: 4 - Tactical Programs

DEVELOPMENT TEST AND EVALUATION PERFORMANCE CHARACTERISTICS

PARAMETER	Validation Phase THRESHOLD	Validation Phase DEMONSTRATED	Full Scale Development Phase THRESHOLD	Full Scale Development Phase DEMONSTRATED	Post-Milestone III GOAL
Minimum Effective Firing Range (yards/(meters))	[redacted]				[redacted]
Maximum Torpedo Preset and Warmup Time (second)	5		5		1
Maximum Torpedo Reactivation Time (minutes)	Demonstrate 3/		Demonstrate		Demonstrate
Dual Torpedo Operation	Demonstrate 3/		Demonstrate		Demonstrate
Self Protection	Demonstrate 3/		Demonstrate		Demonstrate
Shallow Water Operation	[redacted]		[redacted]		[redacted]
Speed (knots)	[redacted]		[redacted]		[redacted]
Depth Range (feet)	[redacted]		[redacted]		[redacted]
Doppler Range (knots)	[redacted]		[redacted]		[redacted]
Maximum False Alarm Rate	[redacted]		[redacted]		[redacted]
Active	[redacted]		[redacted]		[redacted]
Volume Search Rate 1/ (billions of cubic yards/second)	[redacted]		[redacted]		[redacted]
Active	[redacted]		[redacted]		[redacted]
Passive	[redacted]		[redacted]		[redacted]
Reliability 4/	[redacted]		[redacted]		[redacted]
Fleet Exercise Advanced Capability Torpedo System 5/	Not Applicable				
Guidance & Control Subsystem	Not Applicable				
Warhead Exploder Subsystem	Not Applicable				
Electrical Power	Not Applicable				
Instrumentation/Exercise Subsystem	Not Applicable				
Mean Time Between Failures 4/ (minutes)					
Torpedo	Not Applicable				

Program Element: 64675N
Title: MK 48 Advanced Capabilities (Engineering))
DoD Mission Area: 233-Anti-Submarine Warfare
Budget Activity: 4 - Tactical Programs

DEVELOPMENT TEST AND EVALUATION PERFORMANCE CHARACTERISTICS

	Validation Phase		Full Scale Development Phase		Post-Milestone III
PARAMETER	THRESHOLD	DEMONSTRATED	THRESHOLD	DEMONSTRATED	GOAL
Acoustic Guidance & Control Subsystem			[redacted]		[redacted]
Maintainability					
Corrective Maintenance 6/					
Mean Turnaround Time (hours)	Not Applicable				
Maximum Turnaround Time (90%) (hours)	Not Applicable				
Preventive Maintenance 7/					
Frequency-Deployed Shelf Life (years)	Not Applicable				
Supportability					
Compatible with Integrated Logistic Support Plan			Demonstrate		Demonstrate
System Safety			Demonstrate		Demonstrate
Survivability					
Environmental Test (shock, temperature, humidity, etc.)			Demonstrate		Demonstrate
Electromagnetic Vulnerability (Hazards of Electromagnetic Radiation to Ordnance)			Demonstrate		Demonstrate

Notes:
1/ Predicted performance in deep isothermal water, [redacted] decibels/thousand yards. Simulator demonstrations will be used to predict acquisition ranges for conditions that cannot be established by sea runs.
2/ Based on in-water and simulator demonstration.
3/ During validation phase simulator demonstration may be required.
4/ Based on nominal 15 minutes in-water run.
5/ Reliability of torpedo system is product of MK 48 Mod 1/3 subsystem reliabilities and Advanced Capabilities Subsystem reliabilites.

Program Element: 64675N
DoD Mission Area: 233-Anti-Submarine Warfare

Title: MK 48 Advanced Capabilities (Engineering))
Budget Activity: 4 - Tactical Programs

6/ Exercise or warshot turnaround time.
7/ Deployed shelf life.
8/ To Be Determined

Table I-2

OPERATIONAL TEST AND EVALUATION PERFORMANCE CHARACTERISTICS

PARAMETER	Validation Phase THRESHOLD	Validation Phase DEMONSTRATED	Full Scale Development Phase THRESHOLD	Full Scale Development Phase DEMONSTRATED	Post-Milestone III GOAL
Operational Effectiveness 1/					
Sub Threat 2/					
Countered 3/	[redacted]		(To be Determined based on Operational Test I results)		Operational Test II Results
Uncountered			(To be Determined based on Operational Test I results)		Operational Test II Results
Surface Threat 4/					
Countered 3/			(To be Determined based on Operational Test I results)		Operational Test II Results
Uncountered			(To be Determined based on Operational Test I results)		Operational Test II Results
Minimum Effective Firing Range (yards/(meters))	[redacted]		[redacted]		[redacted]
Operational Suitability					
Reliability					
Material Reliability					
Torpedoes (less warhead & wire coil) 7/	[redacted]		[redacted]		[redacted]
Acoustic Guidance & Control Subsystem 7/					

Program Element: [illegible]
DoD Mission Area: [illegible] arine Warfare

Title: MK 48 Advanced Capabilities (Engineering)
Budget Activity: 4 - Tactical Programs

Table I-2

OPERATIONAL TEST AND EVALUATION PERFORMANCE CHARACTERISTICS

	Validation Phase		Full Scale Development Phase		Post-Milestone III
PARAMETER	THRESHOLD	DEMONSTRATED	THRESHOLD	DEMONSTRATED	GOAL
Mean Time Between Failures (minutes)			[		]
Torpedo	7/				
Acoustic Guidance & Control Subsystem	7/				
Maintainability					
Corrective Maintenance					
Mean Turnaround Time 6/ (hours)	7/				
Maximum Turnaround Time (90%)	7/				
Preventive Maintenance					
Frequency-(Deployed Shelf Life) (years)	7/		1.6		1.6
Availability (90 day patrol)	7/		0.90		0.95
Compatibility	Attack Submarines		Attack & Ballistic Missile Submarines		Attac & Ballistic Missile Submarines
Training/Documentation/Procedures	Support Project Operations		Support Operational Evaluation		

Notes:
1/ Values of Operational Effectiveness are based on computer simulation and MK 48 mod 1/3 in-water testing. Predicted performance in deep isothermal water, [ ] target strength (random) long and short range firings in deep, isothermal water; short range firings in typical Greenland-Iceland-United Kingdom gap environment sea states [ ] Speeds from 0 (hovering) to maximum.
2/ [illegible]
3/ Alterted targets employing evasive maneuvering [ ]

Program Element: 64675N
DoD Mission Area: 233-Anti-Submarine Warfare

Title: MK 48 Advanced Capabilities (Engineering)
Budget Activity: 4 - Tactical Programs

4/ Destroyer (1040 Class) speed 5-30 knots.
5/ Based on 15 minute in-water run.
6/ Exercise or Warshot turnaround time.
7/ Not Applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64710N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (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	11,975	15,984	18,704	28,394	Continuing	Continuing
S0371	Energy Conservation/Engineering	9,401	13,051	14,654	19,554	Continuing	Continuing
S0347	Mobility Fuels/Engineering	1,434	2,933	4,050	8,840	Continuing	Continuing
Z0350	Alternative Energy Systems/Engineering	1,140	0	0	0	0	N/A

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports field testing and qualification of more energy efficient equipments and procedures, and new fuel types and energy systems for application to Navy ship, aircraft and shore operations. The conservation project is directed at qualification of procedures and the development of equipments with improved energy efficiency characteristics. The mobility fuels project develops capability for Navy powerplants (ship, aircraft) to operate on petroleum based fuels with less stringent specifications as well as fuels derived wholly or in part from synthetic crudes (shale, coal and tar sands). The alternative energy systems project explored the potential of geothermal, solar, wind, coal and waste to fuel resources and technologies being developed by the National Energy Program, to reduce the dependence of Navy bases on petroleum fuels. The Navy is stressing participation in cooperative ventures with other Executive Agencies and DoD services in all project areas.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Energy Conservation/Engineering: The increase in funding over FY 1982 will be used to accelerate the test, evaluation and qualification of energy conservation equipments and procedures to achieve a conservation goal of 20% reduction per ship steaming hour, 5% per aircraft flying hour, and 20% for shore facilities by 1985 compared to a 1975 baseline. The Energy R&D Program's contribution to achievement of these goals will produce Navy wide energy savings approximating 0.5 billion dollars per year at 1981 fuel prices. The effort places heavy emphasis on reduction of ship hull drag using advanced underwater cleaning, anti-fouling paint technology for existing vessels and improved hull design for future construction. In addition, efforts continue on cost effective, near-term, machinery improvements including automatic boiler controls, improved burners and economizers, more efficient auxiliary power generation equipments, and improved heating/ventilation/air conditioning. Aircraft improvements will include flight testing of aerodynamic modifications and modified operating techniques, and development of in-flight fuel management systems and engine efficiency improvements. In the facilities area development in building thermal design, lighting, power generation and energy monitoring/control techniques will be continued. Emphasis will be placed on retrofit methods for existing shore facilities. Mobility Fuels/Engineering: The mobility fuels effort will consist of test and evaluation in Navy ship and aircraft engines of fuels from new synthetic and lower quality conventional sources entering the

supply system in the near future. This effort will increase as work being conducted in advanced development transitions to require full scale engine testing. An example of such an effort in FY 1983 is the evaluation of new test procedures developed in exploratory and advanced development programs to reduce the cost and time required to certify new fuels for Navy use. 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 due to higher priority funding constraints: a decrease of 1,740 in FY 1981, decrease in FY 1982 of 1,014, and a decrease in FY 1983 of 3,251, resulting in overall reduction in the total Navy RDT&E Program in those years. The level of effort in the individual projects have been reduced roughly in proportion to the overall reduction in 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	5,000	13,715	16,998	21,955	Continuing	Continuing
S0371	Energy Conservation/Engineering	3,141	11,090	13,516	16.871	Continuing	Continuing
S0347	Mobility Fuels/Engineering	1,337	1,480	3,482	5,084	Continuing	Continuing
S0350	Alternative Energy Systems/Engineering	522	1,145	0	0	Continuing	N/A

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: 64710N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This 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 qualification and field testing of procedures and equipment to improve the Navy's energy posture through three (3) project areas: 1) Energy Conservation/Engineering: Improvements will be made in the overall energy conversion 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 requirement 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 - controlled 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 1935. Aircraft Conservation: Flight testing of selected types Navy aircraft will be conducted employing techniques and equipment identified in exploratory development and developed in advanced development. These types include P-3, A-6, A-7, F-14, A-4, F-4 and S-3. 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 already been identified for engineering development that 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. Emphasis in the new construction area has been limited to improving conversion efficiencies for Navy powerplants. 2) Mobility Fuels/Engineering: In this project, critical test and evaluation programs are conducted to develop a capability to operate Navy equipment on (a) broadened specification conventional petroleum-based fuels (i.e. fuels with less strightly controlled properties and/or commercial grade fuels) when military specification fuels are unavailable or in short supply, and (b) fuels derived wholly or in part from synthetic crudes produced from commercial processes. These efforts include evaluation of these fuels in full scale engine tests (e.g. ship diesels, ship and aircraft gas turbines, and ship boilers) under both laboratory conditions and during operational trials. 3) Alternative Energy Systems/Engineering: This project included the Test and Evaluation for Navy use of new alternative energy technologies developed by the National Energy Program to reduce the

Program Element: 64710N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Engineering)
Budget Activity: 4 - Tactical Programs

Navy's basic dependence on petroleum fuels. Technologies of interest include geothermal, solar, refuse to energy, and direct coal utilization.

(U) RELATED ACTIVITIES: 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	U.S. Air Force, NASA
Energy statistics gathering and measurement techniques	Department of Energy
Diesel power plant bottoming cycles	Department of Energy
Electric/Hybrid car demonstration	Department of Energy
Coal Utilization	Army, Department of Energy
Waste-to-fuel	Environmental Protection Agency, Air Force, Various State Governments
Joint program on synthetic fuel test and evaluation	Department of Defense Department of Energy, NASA, Environmental Protection Agency

These programs have been established to avoid duplication of effort and to take advantage of on-going development activities of others to minimize Navy expenditures under this element. This element also employs the positive technical results achieved under related basic research, exploratory development, and advanced development programs.

(U) WORK PERFORMED BY: In-House: David W. Taylor, Naval Ship Research and Development Center, Bethesda, MD, Civil Engineering Laboratory, Port Hueneme, CA; Naval Weapons Center, China Lake, CA; Naval Air Propulsion Center, Trenton, NJ, Naval Air Development Center, Warminster, PA. Contractors: Garret Corp, Phoenix, AZ; General Electric, Lynn, MA; Exxon Research and Engineering Co, Linden, NJ; ACUREX Corp, Mountain View, CA, Vought Corporation, Dallas, TX, Grumman Aerospace, Bethpage, NY, McDonnell Douglas, St. Louis, MO; United Technologies Corp, West Palm Beach, FL; Detroit Diesel Allison, Indianapolis, IN, Westinghouse Electric Corp, Millville, OH; Combustion Engineering Inc., Windsor, CT.

Program Element: 64710N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Engineering)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Conservation/Engineering Ship Conservation: An extensive study of the effectiveness of hull cleaning is underway. Thru FY 1980 some 227 cleaning reports documenting fouling condition before and paint condition after cleaning have been compiled and/or studied. Criteria for cleaning intervals and when to repaint have been established, and an average fuel savings of 8% has been demonstrated on certain instrumented test ships using cleaning techniques developed or selected by this program. Energy generation and usage studies have been completed for all classes of steam powered surface combatants. These studies have led to specific projects aimed at improving boiler efficiency, reducing water consumption, increasing efficiency of auxiliary equipments (e.g. lighting, motors, heating and air conditioning), monitoring of machinery performance, and improvements in operating procedures. Sea trial of many machinery modification projects for steam combatants (e.g. stack gas analyzers, combustion optimizers, machinery performance monitors, improved economizers, high efficiency motors, etc.) are underway. Similarly, trail shafting for the DD-963 class of gas turbine ships and single boiler cross-connect transits by twin shaft steam combatants are typical operational changes recommended to the fleet. Aircraft Conservation: Fuel conservation concepts derived from P.E. 63724N studies have been evaluated for F-4, P-3, F-14, A-6, A-7, A-4 aircraft. For existing aircraft it has been shown that: operational changes, flight performance management, simple aerodynamic changes, and engine modifications are the most promising conservation approaches (in approximate order of decreasing cost effectiveness). Facilities Conservation: Test facilities and hardware for utilizing waste exhaust heat from diesel and turbine power plants (to increase efficiency) are under construction. Polyurethane insulating foam for roofs on metal buildings commonly used at Navy facilities has been tested and certified for use and is now being applied at numerous Naval activities. Lighting controls as well as advanced lighting design procedures evaluated under this program are now being utilized. In cooperation with DOE and the other services, energy monitoring/control systems have been qualified for Naval application and are being installed. (The Navy is lead service in DOD for this technology.) Mobility Fuels/Engineering: Refined products from the Joint Department of Defense/Department of Energy 100,000 bbl shale oil experiment for which the Navy was lead agency have been tested in steam boiler, diesel engines, and gas turbines. All aircraft engine tests are completed and a final report issued. Alternative Energy Systems/Engineering: Installation of the fluidized bed coal fired boiler system has been completed with DOE funds and operation begun. A total of 88 electric vehicles have been purchased under the electric/hybrid vehicle demonstration program funded jointly by the Department of Energy and the Navy. Several of these vehicles have been delivered and are undergoing field tests. Heat recovery incinerator comparison test at Naval Air Station Jacksonville and Naval Station Mayport have been completed.

2. (U) FY 1982 Program: Energy Conservation/Engineering: Ship Conservation: Development projects for anti-fouling hull and propeller coatings will transition from Advanced Development (PE 63724N) funding as commercial sources for manufacture of the polymers are developed. Large scale testing (e.g. quarter or full hull sea trials) of Navy developed anti-fouling paint begins. Heating, ventilation, air conditioning development and large scale hydrodynamics testing also transition from Advanced to

Program Element: 64710N
DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Engineering)
Budget Activity: 4 - Tactical Programs

Engineering development. R&D funding support for certain steam plant improvement projects (e.g. standby main feed pump, machinery performance monitoring) peaks in FY 1982 as these projects near readiness for fleet implementation. Demonstration of improved diesel engine noise isolation techniques will continue, which will allow more efficient diesel generators to be used on future combatant ships. Development of a combustion optimizer for steam combatants and propeller pitch control/trailshafting for DD-963 will reach completion in FY 1982. Machinery optimization studies will be extended to aircraft carriers and auxiliary ships. Aircraft Conservation: Conduct fuel conservation experiments with operational P-3C and S-3A fixed wing ASW squadrons to document the effectiveness and practicality of operational procedure modification concepts. Initiate or continue development of flight performance advisory/management systems for P-3, A-7, A-6, and F-14. Develop fuel efficiency modifications for the J-52 and TF-41 engines which power A-6, TA-4J and A-7 aircraft. Evaluate drooped flaps for A-6 and A-7 and investigate other simple aerodynamic modifications such as pylon removal/modification for the A-7, A-6 and P-3. Initiate flight test of flight performance advisory systems in P-3 aircraft. Facilities: Effort will continue to quantify energy use patterns at Naval facilities in this period to identify areas for immediate corrective action as well as potential areas for R&D efforts. Small experimental projects will continue to develop methods for retrofitting existing facilities with micro processor-based monitoring/control systems, advanced lighting techniques, improved insulating methods and updated air conditioning systems. The value of advanced cogeneration systems for use at Naval facilities will be evaluated. The information acquired on these programs will include technical feasibility, energy savings, and potential for inclusion in the Energy Conservation Investments Program and Military Construction budgets. Testing of advanced energy bottoming cycles for Navy on-site power generation facilities will commence after completion of construction during this time period. Mobility Fuels/Engineering: All ship engine tests on the 100,000 bbl shale oil fuel will be completed and evaluated. Limited endurance testing will be initiated on six current aircraft engines to examine the effects on engine performance and reliability of modifying selected military specification parameters. Relaxation of military specifications can improve fuel availability and hold down price increases.

3. (U) FY 1983 Planned Program: Energy Conservation/Engineering: Ship Conservation: Commercialization and large scale testing of anti-fouling hull and propeller coatings will continue. Development of high efficiency heating, ventilation, and air conditioning systems continues and development of high efficiency motors/motor controllers transitions from Advanced (PE 63724N) to Engineering development. Steam plant improvement projects such as the combustion optimizer and machinery performance monitor transition from development to monitoring of fleet implementation. Machinery optimization studies of major auxiliary ships will continue. Large scale testing of advanced hull forms and propulsion systems will commence as promising concepts emerge from Advanced Development. Aircraft Conservation: Accelerate development of flight performance advisory monitoring systems for P-3, A-6, F-14, and A-7. Expand study of applicability of these on-board systems to S-3A, C-9, C-130, E-2/C-2 and other aircraft. Complete evaluation of fuel savings modifications for the P-3 and A-7 (e.g., improved fuel gauging system for P-3 and drooped flaps for A-7). Accelerate development of A-6 fuel savings modifications such as drooped flaps and replacement of the flat-plate windshield. Complete development and test and evaluation on the TF-41 and J-52 engine efficiency improvements. Flight test flight performance advisory systems in P-3 and A-7 aircraft. Facilities: Retrofit demonstration of energy monitoring/control

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DOD Mission Area: 235 - Naval Warfare Support

Title: Navy Energy Program (Engineering)
Budget Activity: 4 - Tactical Programs

systems and advanced lighting techniques will continue. The organic Rankine bottoming system test and evaluation effort at Naval Air Station, Bermuda will be completed during this period. Mobility Fuels/Engineering: Full-scale, land-based engine and boiler tests will begin on petroleum based fuels of broadened and/or commercial specification as well as on referee petroleum based fuels to verify proposed alternative fuel evaluation procedures. These procedures will be designed to reduce the cost and time required to certify new fuels, including synthetics, for Navy use. The purpose of this test and evaluation work is to obtain data on the performance of these fuels in full scale equipment so that the Navy will have the technology base required to operate on these alternative fuels when conventional military specification fuels are unavailable or in short supply. Tests will be conducted on ship boilers, ship-based diesels, and ship and aircraft gas turbines.

4. (U) FY 1984 Planned Program: Energy Conservation/Engineering: Ship Conservation: Complete polymer commercialization for anti-fouling paints and conduct fleet technical evaluation. Test and evaluation of energy efficient hydrodynamic modifications for future ship designs accelerates. The standby main feed pump operational evaluation will be completed, thus completing development of equipment modifications, for the existing steam fleet. Continued development and test and evaluation of auxiliary equipments (e.g. desalinization plants; heating, ventilation and air conditioning; lighting; energy storage; electric motors, etc) concentrates on needs of existing and future gas turbine ships. Aircraft Conservation: Evaluate fuel savings modifications for S-3A, C-9, C-130, E-2/C-2 and other aircraft in accordance with studies performed in PE 63724N during FY 1983. Continue development of flight performance advisory/management systems for P-3, A-6, A-7, F-14, S-3A and other Naval aircraft. Continue development of A-6 aircraft fuel savings modifications. Facilities: The energy monitoring and control systems, as well as cogeneration tasks, will continue at a low level. Mobility Fuels/Engineering: Begin full scale aircraft and ship engine performance and endurance tests with broadened specification petroleum based fuels and fuels derived from first commercial oil shale facilities (under Defense Production Act contractual agreements). The test data will also be used to validate the improved fuels test procedures developed in a parallel portion of the program.

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

6. (U) Milestones: Not Applicable.

Project: S0371 Title: Energy Conservation/Engineering
Program Element: 64710N Title: Navy Energy Program (Engineering)
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project is designed to improve the energy efficiency of naval systems and thereby 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 tempo, 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. This project is consistent with conservation goals stated in the White House Executive Order 12003. The Navy is stressing participation with other agencies and Department of Defense services in all project areas. This project supports qualification and field testing of energy procedures and equipments to improve the Navy's energy conservation posture in three (3) platform areas; 1) Ship Conservation: The development and use of advanced underwater hull cleaning methods to reduce hull drag caused by fouling will continue to provide, in the near-term, over 8% savings in ship energy usage. Development and use of improved anti-fouling paints expected by 1985 will reduce the requirement for frequent hull cleaning between overhaul periods and represents an additional energy savings of 10% over hull cleaning. Further developments are expected in the machinery area with the use of stack gas analyzer-controlled boilers, improved boiler burners and economizers, improved auxiliary power systems, machinery performance monitoring systems and reduction in fresh water use. The projected saving associated with these areas is approximately 20% by 1985. 2) Aircraft Conservation Flight testing of selected equipment modifications and operating technique changes to existing aircraft will be supported under this project. Aircraft types will include P-3, A-7, F-14, A-6, A-4 and S-3. Equipment changes will include, cost-effective aerodynamic-drag clean-up modifications, flight management computer aids, and engine efficiency enhancements. Modified operating procedures which will improve refueling practices, pre-flight planning, and flight efficiency will also be tested. 3) Facility Conservation: The major thrust is to meet the Presidentially directed reduction in facility energy use of 20% in existing structures and 45% in new structures by 1985 and to reduce escalating energy costs. Primary emphasis is being placed on potential retrofits to existing buildings to meet this deadline. Tasks have already been identified for engineering development that will provide the greatest savings and have the highest pay-back potential. This task includes 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 and improved building thermal design. The facility activity is limited to those areas where potential cost savings are high.

(U) RELATED ACTIVITIES: Numerous interservice and interagency cooperative programs are in effect for the conservation program; the following is a partial listing:

Information on aircraft energy efficiency	U.S. Air Force, NASA
Energy statistics gathering and measurement techniques	Department of Energy
Diesel powerplant bottoming cycles	Department of Energy
Heat exchanger technology	Department of Energy
Electric/Hybrid vehicle demonstration	Department of Energy

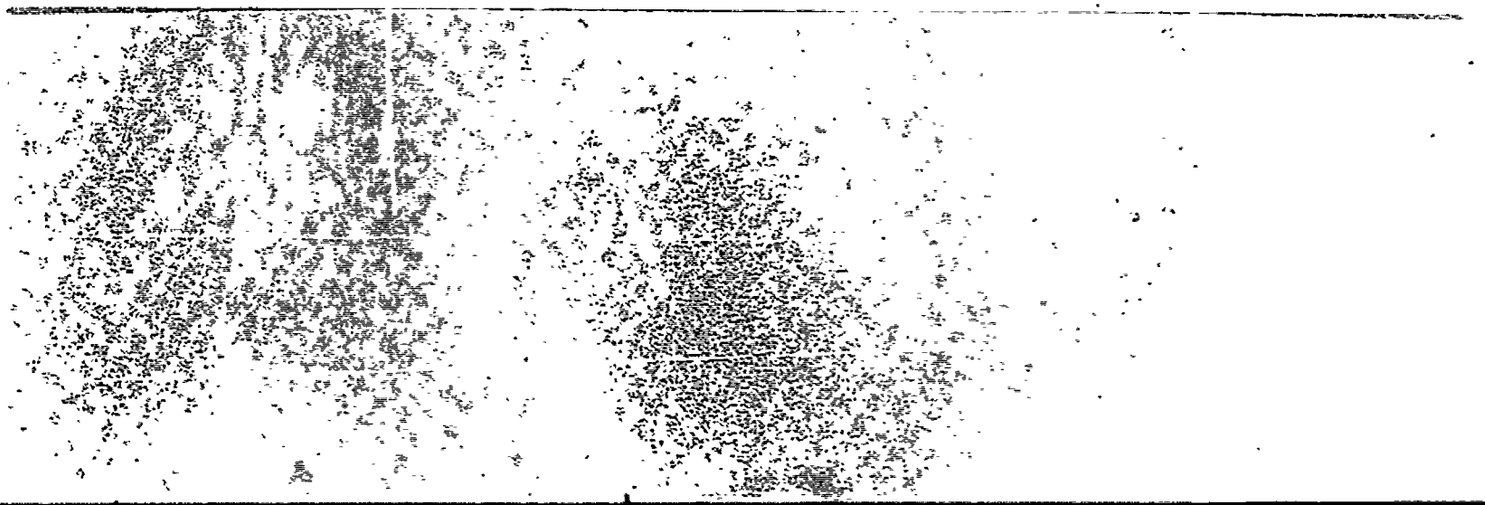
Project: S0371 Title: Energy Conservation/Engineering
Program Element: 64710N Title: Navy Energy Program (Engineering)
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

These programs have been established to avoid duplication of effort and to take advantage of on-going developmental activities to minimize Navy expenditures under this project. This project also employs the positive technical results achieved under the conservation segments of Program Element 63724N, Navy Energy Program (Advanced).

(U) WORK PERFORMED BY: In-House: David W. Taylor, Naval Ship Research and Development Center, Bethesda, MD; Civil Engineering Laboratory, Port Hueneme, CA; Naval Air Development Center, Johnsville, PA; Naval Ship Systems Engineering Station, Philadelphia, PA; Contractors: Vought Corporation, Dallas, TX; Grumman Aerospace, Bethpage, NY; McDonnell Douglas, St. Louis, MO; United Technologies Corp, West Palm Beach, FL; Detroit Diesel Allison, Indianapolis, IN; Terry Turbine Corp, Niantic, CT; Westinghouse Electric Corp, Millville, OH; Combustion Engineering Inc., Windsor, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Ship Conservation: An extensive study of the effectiveness of hull cleaning is underway. Thru FY 80 some 227 cleaning reports documenting fouling condition before and paint condition after cleaning have been compiled and/or studied. Criteria for cleaning intervals and when to repaint have been established, and an average fuel savings of 8% has been demonstrated on certain instrumented test ships using cleaning techniques developed or selected by this program. Energy generation and usage studies have been completed for all classes of steam powered surface combatants. These studies have led to specific projects aimed at improving boiler efficiency, reducing water consumption, increasing efficiency of auxiliary equipments (e.g. lighting, motors, heating and air conditioning), monitoring of machinery performance, and improvements in operating procedures. Sea trial of many machinery modification projects for steam combatants (e.g. stack gas analyzers, combustion optimizers, machinery performance monitors, improved economizers, high efficiency motors, etc.) are underway. Similarly, trail shafting for the DD-963 class of gas turbine ships and single boiler cross-connect transits by twin shaft steam combatants are typical operational changes recommended to the fleet. Aircraft Conservation: Fuel conservation concepts derived from P.E. 63724N studies have been evaluated for F-4, P-3, F-14, A-6, A-7, A-4 aircraft. For existing aircraft it has been shown that: operational changes, flight performance management, simple aerodynamic changes, and engine modifications are the most promising conservation approaches (in approximate order of decreasing cost effectiveness). Facilities Conservation: Test facilities and hardware for utilizing waste exhaust heat from diesel and turbine power plants (to increase efficiency) are under construction. Polyurethane insulating foam for roofs on metal buildings commonly used at Navy facilities has been tested and certified for use and is now being applied at numerous Naval activities. Lighting controls as well as advanced lighting design procedures evaluated under this program are now being utilized. In cooperation with DOE and the other services, energy monitoring/control systems have been qualified for Naval application and are being installed. (The Navy is lead service in DOD for this technology.)



Project: S0371 Title: Energy Conservation/Engineering
Program Element: 64710N Title: Navy Energy Program (Engineering)
DOD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Ship Conservation: Development projects for anti-fouling hull and propeller coatings will transition from Advanced Development (PE 63724N) funding as commercial sources for manufacture of the polymers are developed. Large scale testing (e.g. quarter or full hull sea trials) of Navy developed anti-fouling paint begins. Heating, ventilation, air conditioning development and large scale hydrodynamics testing also transition from Advanced to Engineering development. R&D funding support for certain steam plant improvement projects (e.g. standby main feed pump, machinery performance monitoring) peaks in FY 1982 as these projects near readiness for fleet implementation. Demonstration of improved diesel engine noise isolation techniques will continue, which will allow more efficient diesel generators to be used on future combatant ships. Development of a combustion optimizer for steam combatants and propeller pitch control/trailshafting for DD-963 will reach completion in FY 1982. Machinery optimization studies will be extended to aircraft carriers and auxiliary ships. Aircraft Conservation: Conduct fuel conservation experiments with operational P-3C and S-3A fixed wing ASW squadrons to document the effectiveness and practicality of operational procedure modification concepts. Initiate or continue development of flight performance advisory/management systems for P-3, A-7, A-6, and F-14. Develop fuel efficiency modifications for the J-52 and TF-41 engines which power A-6, TA-4J and A-7 aircraft. Evaluate drooped flaps for A-6 and A-7 and investigate other simple aerodynamic modifications such as pylon removal/modification for the A-7, A-6 and P-3. Initiate flight test of flight performance advisory systems in P-3 aircraft. Facility Conservation: Effort will continue to quantify energy use patterns at Naval facilities in this period to identify areas for immediate corrective action as well as potential areas of R&D efforts. Small experimental projects will continue to develop methods for retrofitting existing facilities with micro processor-based monitoring/control systems, advanced lighting techniques, improved insulating methods and updated air conditioning systems. The value of advanced cogeneration systems for use at Naval facilities will be evaluated. The information acquired on these programs will include technical feasibility, energy savings, and potential for inclusion in the Energy Conservation Investments Program and Military Construction budgets. Testing of advanced energy bottoming cycles for Navy on-site power generation facilities will commence after completion of construction during this time period.

3. (U) FY 1983 Planned Program: Ship Conservation: Commercialization and large scale testing of anti-fouling hull and propeller coatings will continue. Development of high efficiency heating, ventilation, and air conditioning systems continues and development of high efficiency motors/motor controllers transitions from Advanced (PE 63724N) to Engineering development. Steam plant improvement projects such as the combustion optimizer and machinery fleet implementation. Machinery optimization studies of major auxiliary ships will continue. Large scale testing of advanced hull forms and propulsion systems will commence as promising concepts emerge from Advanced Development. Aircraft Conservation: Accelerate development of flight performance advisory monitoring systems for P-3, A-6, F-14, and A-7. Expand study of applicability of these on-board systems to S-3A, C-9, C-130, E-2/C-2 and other aircraft. Complete evaluation of fuel saving modifications for the P-3 and A-7 (e.g. proved fuel gauging system

for P-3 and drooped flaps for A-7). Accelerate development of A-6 fuel savings modifications such as drooped flaps and replacement of the flat-plate windshield. Complete development and test and evaluation on the TF-41 and J-52 engine efficiency improvements. Flight test flight performance advisory systems in P-3 and A-7 aircraft. Facilities Conservation: Retrofit demonstrations of energy monitoring/control systems and advanced lighting techniques will continue. The organic rankine bottoning system test and evaluation effort at Naval Air Station, Bermuda will be completed during this period.

4. (U) FY 1984 Planned Program: Ship Conservation: Complete polymer commercialization for anti-fouling paints and conduct fleet technical evaluation. Test and evaluation of energy efficient hydrodynamic modifications for future ship designs accelerates. The standby main feed pump operational evaluation will be completed, thus completing development of equipment modifications, for the existing steam fleet. Continued development of auxiliary equipments (e.g. desalinization plants; heating, ventilation and air conditioning; lighting; energy storage; electric motors, etc) concentrates on needs of existing and future gas turbine ships. Aircraft Conservation: Evaluate fuel savings modifications for S-3A, C-9, C-130, E-2/C-2 and other aircraft in accordance with studies performed in PE 63724N during FY 1983. Continue development of flight performance advisory/management systems for P-3, A-6, A-7, F-14, S-3A and other Naval aircraft. Continue development of A-6 aircraft fuel savings modifications. Facility Conservation: The energy monitoring and control systems, as well as cogeneration tasks, will continue at a low level.

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
S0371	Energy Conservation/Engineering	9,401	13,051	14,654	19,554	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64711N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (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	9,476	10,629	15,505	20,181	Continuing	Continuing
X0697	Fleet Command Support/Composite Operational Reporting System	764	677	848	341	Continuing	Continuing
X0714	Ocean Surveillance Information System	1,974	2,466	3,927	2,437	Continuing	Continuing
X1144	Navy Command and Control System Ashore	6,738	7,486	10,730	17,403	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Hardware and software upgrades will provide incremental improvements to correct Navy Command and Control System Ashore system deficiencies identified during Phase I (baseline analysis) from July 1977 to June 1979. Evolutionary upgrades to this continuing command and control and information support system will also satisfy requirements stated in the Navy Command and Control Plan and incrementally work toward 100% attainment of validated Navy Command and Control Systems Ashore Required Operational Capabilities. All efforts will improve the capability of Navy commanders to make and promulgate decisions based upon sufficiently accurate and timely information while satisfying the information requirements of National Command Authorities and the Joint Chiefs of Staff and interoperating with NATO and allied Navies where appropriate.

(U) BASIS FOR FY 1983RDT&E REQUEST: Continue to improve the data management and command and control information handling capabilities within the Navy Command and Control shore nodes. Significant software enhancements and comprehensive operational testing require program increases of 4,876 in FY 1983. A large part of this increase (1,461) is programmed to support upgrades to the Ocean Surveillance Information 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 a decrease of $168 in FY 1981 and $414 in FY 1982 due to inflation and economics reductions in FY 1981 and FY 1982. The increase of $68 in FY 1983 is due to additional funding of Navy Command and Control System transition efforts and engineering changes in Composite Operational Reporting System that will allow the bulk of the required software development to be advanced to FY 1983.

Program Element: 64711N Title: Command and Control Systems (Engineering)
DoD Mission Area: 353 - 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	6,099	9,644	11,043	15,437	Continuing	Continuing
X0697	Fleet Command Support/Composite Operational Reporting System	520	825	758	390	Continuing	Continuing
X0714	Ocean Surveillance Information System	1,215	1,985	2,500	4,050	Continuing	Continuing
X1144	Navy Command and Control System Ashore	4,072	6,834	7,785	10,997	Continuing	Continuing
X1458	Naval Ocean Surveillance Information Center Upgrade	292	0	0	0	0	292

(U) OTHER APPROPRIATIONS FUNDS:

Communications and Electronic Equipment	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
Total Other Procurement, Navy (OPN)	0	5,294	6,573	1,013	Continuing	Continuing
Military Construction, Navy (MCON)	0	2,900	0	0	Continuing	Continuing
Operations and Maintenance, Navy (O&MN)	0	1,800	0	0	Continuing	Continuing

Program Element: 64711N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program consists of three projects. The Navy Command and Control System Ashore consists of 33 operational sites worldwide, a training site and an engineering development site. Navy Command and Control System Ashore ensures that Navy commanders are able to make and promulgate decisions based upon sufficiently accurate and timely information. Primary interfaces are with the Worldwide Military Command and Control System at the Fleet Commander-in-Chief level and with Navy Combat Direction Systems at the unit level. Additional interfaces with National and Naval Intelligence systems and sources are provided via the Ocean Surveillance Information System subelement. Requirements for Navy Command and Control System Ashore are stated in the Navy Command and Control Plan, the Navy Command and Control System Ashore Required Operational Capabilities and the Navy Command and Control System Change Requests. The Composite Operational Reporting System project satisfies a Chief of Naval Operations operational requirement to standardize the Navy Reporting System in order to achieve increased reporting responsiveness, improve accuracy of reporting and reduce man intensive efforts in originating readiness reports. Additionally the Composite Operational Reporting System satisfies a Navy Command and Control System Ashore requirement to reduce the man hours associated with correcting operational reports in order to maintain data base accuracy. The Composite Operational Reporting System will integrate existing operational reports into one set of standardized reports while reducing current duplicative reporting of the same elements of information in the present system. The Composite Operational Reporting System will provide interoperability with the Joint Chiefs of Staff and NATO reporting requirements where appropriate.

(U) RELATED ACTIVITIES: Hardware and software upgrades in the Navy Command and Control System Ashore must not only address internal system requirements but must also evolve with improvements in the Worldwide Military Command and Control System, Navy Combat Direction System, and National/Naval Intelligence Collection systems. As additional capabilities are incorporated into external sensor systems, the Navy Command and Control System Ashore data bases, information transfer and display techniques must be upgraded in order to be responsive to the needs of Navy commanders. Interfaces are effected with the following programs: PE 63735N, Worldwide Military Command and Control System Architecture Support; PE 63228N, Carrier ASW Module; PE 24311N, Undersea Surveillance Systems; PE 63717N, Command and Control Systems (Advanced); PE 62721N, Command and Control Technology; PE 63763N, Integrated Tactical Surveillance System.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Commander, Operational Test and Evaluation Force, Norfolk, VA; Naval Shore Electronics Engineering Activity Pacific, Pearl Harbor, Hawaii, and Yokosuka, Japan; the Naval Electronics Systems Engineering Centers, Portsmouth, VA and Vallejo, CA; and the Naval Electronic System Command Detachment, Patuxent River, MD. Contractors: PRC Information Sciences Co., McLean, VA; CTEC, Inc., Falls Church, VA. VITRO Laboratories, Silver Spring, MD; Sterling Laboratories, Sterling, VA; Systems Exploration, Inc., San Diego, CA.

Program Element: 64711N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Engineering)
Budget Activity: 4.- Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: When the Chief of Naval Operations formed the Navy Command and Control System Ashore in May 1977, a three phase plan of action was instituted to identify system and site deficiencies, make improvements, and test and evaluate the upgraded system. During Phase I (July 1977-June 1979) site surveys and a baseline analysis were completed, a plan to upgrade the baseline system was developed, Submarine Operating Authorities were added as Navy Command and Control System Ashore nodes in May 1978, and the Navy Command and Control System Ashore Required Operational Capabilities were coordinated and prioritized with fleet commanders and validated by the Chief of Naval Operations. Upgraded performance specifications for the Navy Command and Control System have been developed and are included in the Test and Evaluation Master Plan 240-1 which will be updated yearly. Phase II of the Navy Command and Control System Ashore program ran from July 1979 - September 1981 and consisted of upgrades concentrating on the minimum essential Required Operational Capabilities. Upgrades including both hardware and software improvements were developed. A formal development and operational test effort was undertaken to test all hardware and software products for conformance with stated operational requirements. Design and testing of upgrades are accomplished in an evolutionary manner in accordance with DOD Directive 5000.1, DOD Directive 5000.2 and Chief of Naval Operations 3960.10 guidance. In accordance with DOD directives, the Chief of Naval Operations has initiated quarterly reviews of selected Navy Command and Control System projects. Three reviews were conducted in 1981. A competitive contract was awarded to Planning Research Corporation for software maintenance and enhancement of Navy Command and Control System products.

2. (U) FY 1982 Program: Navy Command and Control System Ashore upgrades to Navy Worldwide Military Command and Control System software standard software, the Ocean Surveillance Information System Baseline subsystem will be completed and tested in accordance with the Test and Evaluation Master Plan. A competitive acquisition will be advertised for the next incremental upgrade to the Ocean Surveillance Baseline subsystem. The development of system performance specifications and operational concepts for the next generation of Navy Command and Control System improvements will be initiated. Recognizing the present evolutionary nature of the Navy Command and Control Ashore System, further upgrades are identified in the new Navy Command and Control System Program Engineering and Development Plan. Upgrade efforts will incorporate the requirements of the Navy Command and Control Plan.

3. (U) FY 1983 Planned Program: Navy Command and Control System Ashore upgrades to correct deficiencies identified during Phase II testing will commence. System upgrades and testing will continue in accordance with the new Program Engineering and Development Plan which will be updated yearly in consonance with the current Planning, Programming and Budgeting System cycle. Hardware procurement will continue and military construction will be completed for a Navy Command and Control System Ashore training facility to be staffed and managed by Chief of Naval Education and Training in FY 1984. The transfer of Navy Command and Control System Ashore training will allow the Engineering Development Facility to devote all resources to their primary function. The development of upgraded correlation capabilities will continue. The development of system specifications for Navy Command and Control System Ashore transition upgrades will be completed and engineering design will be initiated.

Program Element: 64711N
DoD Mission Area: 353 - Naval Warfare

Title: Command and Control Systems (Engineering)
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Correlation upgrades will be deployed to the first two sites and operational testing of these upgrades will be conducted. Design of follow on transition upgrades will continue and development will be initiated. Acquisition of prototype upgrade hardware will be initiated.

5. (U) Program to Completion: Continue to upgrade the Navy Command and Control System Ashore while working toward 100% completion on the Navy Command and Control System Ashore Required Operational Capabilities. Evolutionary developments will continue in consonance with the Navy Command and Control Plan. Ensure that Navy Command and Control System Ashore upgrades and interfaces address the requirements of future Worldwide Military Command and Control System Information System, Navy Combat Direction System, and National/Navy Intelligence Collection Systems' enhancements. This is a continuing program.

6. (U) Milestones: Not applicable.

Project: X1144
Program Element: 64711N
DoD Mission Area: 353 - Naval Warfare

Title: Navy Command and Control System Ashore
Title: Command and Control Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Navy Command and Control System Ashore serves 33 operational sites worldwide, a training site and an engineering development site, extends from the Worldwide Military Command and Control System interface at theater command centers to the Combat Direction Systems of Navy weapons systems platforms. Navy Command and Control System Ashore ensures that Navy commanders are able to make and promulgate decisions based upon sufficiently accurate and timely information. While the subelements of Navy Command and Control System Ashore are now managed as an integrated system, the respective hardware and software of the subelements still reflect their independent origin. The Navy Command Center/Fleet Command Center subelement is comprised of four facilities supporting the Chief of Naval Operations and three fleet Commanders-in-Chief. The Navy Command and Control Center/Fleet Command Center are the Navy Command and Control Systems Ashore interface with the Worldwide Military Command and Control System. The Navy Command and Control System Ashore software (Navy Worldwide Military Command and Control System Software Standardization) resides on Honeywell 6000 hardware and furnishes automated support for commanders by providing communication switching, message processing, data base maintenance and reporting capabilities required to assess enemy threat and to monitor own force readiness status and deployment. Navy Worldwide Military Command and Control System Software Standardization software provides this information in a timely fashion to the theater commander, his force commanders and ultimately to his task group commanders. The Ocean Surveillance Information System subelement is comprised of six all source fusion centers supporting national authorities and the Chief of Naval Operations, theater commanders, and the deployed numbered fleet commanders. The Anti-Submarine Warfare subelement is comprised of four Force High Level terminals and fourteen High Level Terminals which provide theater, numbered fleet, task force and task group commanders with ocean surveillance and anti-submarine warfare information from Navy maritime patrol aircraft. Force High Level Terminals are based upon UYK-7 hardware while High Level Terminals are CP-901 hardware. Force High Level Terminals' and High Level Terminals' software support Navy commanders by providing message processing and origination aids, integrated own force and hostile force information and environmental data. Access to the theater Navy Worldwide Military Command and Control System Software Standardization data base is also provided. Submarine Operating Command Centers consist of five facilities which support Navy theater commanders and numbered fleet commanders in submarine area operations. Four of these centers are supported by USQ-81(V) Shore Targeting Terminals. A Navy Command and Control System Ashore Engineering Development facility is located in Patuxent River, MD. Portions of this facility presently serve as the Navy Command and Control System Ashore training facility.

(U) RELATED ACTIVITIES: Hardware and software upgrades in the Navy Command and Control System Ashore must not only address internal system requirements but must also evolve with improvements in the Worldwide Military Command and Control System, Navy Combat Direction System, and National/Naval Intelligence Collection systems. As additional capabilities are incorporated into external sensor systems, the Navy Command and Control System Ashore data bases, information transfer and display techniques must be upgraded in order to be responsive to the needs of Navy commanders. Interfaces are effected with the following programs: PE 63735N, Worldwide Military Command and Control System Architecture Support; PE 63228N, Carrier ASW Module; PE 24311N, Undersea Surveillance Systems; PE 63717N, Command and Control Systems (Advanced); PE 62721N, Command and Control Technology; PE 63763N, Integrated Tactical Surveillance System.

Project: X1144
Program Element: 64711N
DoD Mission Area: 353 - Naval Warfare

Title: Navy Command and Control System Ashore
Title: Command and Control Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Commander, Operational Test and Evaluation Force, Norfolk, VA; Naval Shore Electronics Engineering Activity Pacific, Pearl Harbor, Hawaii, and Yokosuka, Japan; the Naval Electronics Systems Engineering Center, Portsmouth, VA and Vallejo, CA; and the Naval Electronic System Command Detachment, Patuxent River, MD. Contractors: PRC Information Sciences Co., McLean, VA; CTEC, Inc., Falls Church, VA. VITRO Laboratories, Silver Spring, MD; Sterling Laboratories, Sterling, VA; Systems Exploration, Inc., San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: When the Chief of Naval Operations formed the Navy Command and Control System Ashore in May 1977, a three phase plan of action was instituted to identify system and site deficiencies, make improvements, and test and evaluate the upgraded system. During Phase I (July 1977-June 1979) site surveys and baseline analysis were completed, a plan to upgrade the baseline system was developed, Submarine Operating Authorities were added as Navy Command and Control System Ashore nodes in May 1978, and the Navy Command and Control System Ashore Required Operational Capabilities were coordinated and prioritized with fleet commanders and validated by the Chief of Naval Operations. Upgraded performance specifications for the Navy Command and Control System have been developed and are included in the Test and Evaluation Master Plan 240-1 which will be updated yearly. Phase II of the Navy Command and Control System Ashore program ran from July 1979 - September 1981 and consisted of upgrades concentrating on the minimum essential Required Operational Capabilities. Upgrades including both hardware and software improvements were developed. A formal development and operational test effort was undertaken to test all hardware and software products for conformance with operational requirements. Design and testing of upgrades are accomplished in an evolutionary manner in accordance with DOD Directive 5000.1, DOD Directive 5000.2 and Chief of Naval Operations 3960.10 guidance. In accordance with DOD directives; the Chief of Naval Operations has initiated a quarterly review of selected Navy Command and Control System projects. Three reviews were conducted in 1981. A competitive contract was awarded to Planning Research Corporation for software maintenance and enhancement of Navy Command and Control System products.

2. (U) FY 1982 Program: Navy Command and Control System Ashore upgrades to Navy Worldwide Military Command and Control System Software Standard software and the Force High Level Terminal will be completed and tested in accordance with the Test and Evaluation Master Plan. The development of system performance specifications and operational concepts for the next generation of Navy Command and Control System improvements will be initiated. Recognizing the present evolutionary nature of the Navy Command and Control Ashore System, further upgrades will be identified in the new Navy Command and Control System Program Engineering and Development Plan. Upgrade efforts will incorporate the requirements of the Navy Command and Control Plan.

3. (U) FY 1983 Planned Program: Navy Command and Control System Ashore upgrades to correct deficiencies identified during Phase II testing will commence. System upgrades and testing will continue in accordance with the Program Engineering and Development Plan which will be updated yearly in consonance with the current Planning, Programming and Budgeting System cycle. Hardware

Project: X1144 Title: Navy Command and Control System Ashore
Program Element: 64711N Title: Command and Control Systems (Engineering)
DoD Mission Area: 353 - Naval Warfare Budget Activity: 4 - Tactical Programs

procurement will continue and military construction will be completed for a Navy Command and Control System Ashore training facility to be staffed and managed by Chief of Naval Education and Training in FY 1984. The transfer of Navy Command and Control System Ashore training will allow the Engineering Development Facility to devote all resources to their primary function. The development of system specifications for Navy Command and Control System Ashore transition upgrades will be completed and engineering design will be initiated. Increased funding of $3,244 is due to increased program scope in system design.

4. (U) FY 1984 Planned Program: Design of follow on transition upgrades will continue and development will be initiated. Acquisition of prototype upgrade hardware will be initiated.

5. (U) Program to Completion: Continue to upgrade the Navy Command and Control System Ashore while working toward 100% completion of the Navy Command and Control System Ashore Required Operational Capabilities. Evolutionary developments will continue in consonance with the Navy Command and Control Plan. Ensure that Navy Command and Control System Ashore upgrades and interfaces address the requirements of future Worldwide Military Command and Control System Information System, Navy Combat Direction System, and National/Navy Intelligence Collection Systems' enhancements. This is a continuing project.

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
X1144	Navy Command and Control System Ashore	6,738	7,486	10,730	17,403	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64713N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: 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	24,624	15,862	9,882	2,852	-	158,366
S0234	Tactical Towed Array Sonar AN/SQR-19	24,624	15,862	9,882	2,852	-	158,366
	Quantity (Development Test and Evaluation/Operational Test and Evaluation						(3)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will develop the AN/SQR-19 tactical towed array sonar to provide anti-submarine warfare ships with a tactical passive detection, classification and tracking capability against [redacted] in support of the Navy's sea control function. The AN/SQR-19 will be the [redacted] for all battle group and convoy escorts in the 1990's and will be installed in [redacted] It will, in conjunction with the Light Airborne Multi-Purpose System (LAMPS) MK III, provide a [redacted]

(U) BASIS FOR FY 1983 RDT&E REQUEST: During FY 1983, the engineering development model of the AN/SQR-19 installed [redacted] Final pre-production testing will be concluded at the contractor's plants prior to Production Decision Milestone (DSARC III) in second quarter FY 1983. 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 total program cost has increased by 66. This increase is made up of (a) an increase of 1,610 in FY 1981 due to deficiencies in government furnished equipment; and (b) decreases of 950 and 594 in FY 1982 and FY 1983 and outyears, respectively to adjust economic inflation to lower predicted values and a reduction in contractors and studies funding.

Program Element: 64713N
Title: Tactical Towed Array Sonar
DoD Mission Area: 233 - 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	29,624	23,014	16,812	10,261	3,067	158,300
S0234	Tactical Towed Array Sensor AN/SQR-19	29,624	23,014	16,812	10,261	3,067	158,300

(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
AN/SQR-19	OPN	0	7,574	77,290	153,863	726,873	965,600
	Quantity	(0)	(0*)	(5*)	(16)	(76)	(97)
	SCN	0	30,150	49,930	53,052	206,900	340,032
	Quantity	(0)	(3)	(5)	(5)	(19)	(32)

Notes: *FY 1982 procurement consists only of procurement of AN/UYQ-21 display sets. FY 1983 consists of both systems (5) and display sets. These displays are units of the AN/SQR-19 which are shared with Light Airborne Multi-Purpose System MK III shipboard electronics, when the aircraft is airborne. Procurement of these displays is required to support Light Airborne Multi-Purpose System MK III installations which occur before availability of the AN/SQR-19.

Program Element: 64713N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Tactical Towed Array Sonar
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Towed arrays provide surface ships with a passive acoustic detection, classification, and tracking capability against submarines and surface ships under most environmental conditions. They provide significant performance increases over hull-mounted sensors by virtue of their use of larger acoustic apertures and their location remote from platform noise interference. In towed array systems, acoustic data received by flexible line hydrophone arrays are telemetered through the tow cable to the tow ship for processing, display and analysis. Surface ship towed array development was originally initiated in FY 1968 and a specific requirement for the development of tactical towed arrays for anti-submarine warfare capable surface ships was identified in FY 1973. This led to establishment of the Escort Towed Array Sensor program which was pursued concurrently with that of the Submarine Surveillance Towed Array Sensor Segment under Program Element 63794N, ASW Surveillance, until June 1975. At that time, a separate program was established for tactical towed array development (Program Element 63690N), and system nomenclature was changed to Tactical Towed Array Sonar (TACTAS). The Tactical Towed Array Sonar program now incorporates two systems: The AN/SQR-18A which provided an early operational capability to FF-1052 class ships while serving as the basis for development of operational doctrine and tactics, and the AN/SQR-19 which will provide significantly greater [redacted] capabilities for designated anti-submarine warfare surface ships. Transition from advanced to engineering development of the AN/SQR-19 was authorized on 16 August 1976, by the Deputy Secretary of Defense, following a Defense Systems Acquisition Review Council (DSARC) Milestone II program review. During FY 1978, the AN/SQR-19 program was restructured to use standard Navy building blocks (displays, signal and data processors) to the greatest extent feasible. All technical and programmatic milestones have been met since that date. The AN/SQR-19 development program involves procurement of three engineering development models - two for development, test and evaluation ashore (design certification, environmental testing, reliability assessment, and maintainability demonstration) and one for shipboard installation [redacted] to conduct the initial operational test and evaluation. The AN/SQR-19 system will utilize standard Navy signal processors (AN/UYS-1), computers (AN/UYK-20), and display units (AN/UYQ-21), as well as a contractor furnished signal conditioner and receiver which will perform [redacted] functions, which are not feasible in standard hardware. Concurrently with installation in fleet ships, [redacted] the AN/SQR-19 will be integrated with the improved AN/SQS-53B Sonar and Light Airborne Multi-Purpose System MK III by the ASW Combat Systems Integration Program (Program Element 25620N).

(U) RELATED ACTIVITIES: Program Element 25620N, Anti-Submarine Warfare Combat System Integration - Development of fully integrated anti-submarine warfare control subsystem for coordinated employment of anti-submarine warfare sensor, fire control and weapon systems; Program Element 25623N, AN/SQS-53B (S0217) - Modernization of the surface ship, hull-mounted AN/SQS-53 Sonar; PE 25624N, AN/SQR-18 Improvement Program, improve AN/SQR-18A TACTAS; Program Element 64212N, Light Airborne Multi-Purpose System MK III - Development of an anti-submarine warfare helicopter for deployment from surface ships; Program Element 63553N, Advanced Surface Sonar (S0220) - Development of passive localization procedures/algorithms; and Surface Ship Silencing (S0229) - Reduction of towing ship self and radiated noise.

Program Element: 64713N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Tactical Towed Array Sonar
Budget Activity: 4 - Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, New London, CT (lead laboratory). Contractors: General Electric Company, Syracuse, NY; Chesapeake Instruments Division, Gould Incorporated, Glen Burnie, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: To resolve key technical and operational issues, experimental towed array systems were developed under various projects, including the Patterson Experimental Array, which was procured in FY 1972 to study high speed self-noise and array strength and to evaluate an advanced telemetry system. A [ ] array was also procured in FY 1972 [ ] to establish baseline performance [ ]. A contract was awarded in August 1974 for the fabrication of two Interim Escort Towed Array Sensors (later designated AN/SQR-18) to obtain data required for development of Tactical Towed Array Sonar tactical doctrine and test and evaluation parameters. In FY 1976, the AN/SQR-18 completed technical/operational evaluation and received provisional approval for service use. The two prototype AN/SQR-18s were deployed [ ]. In FY 1977, a contract was awarded for production of AN/SQR-18A systems and follow-on test and evaluation was conducted. Upon establishment of a separate tactical towed array development program in July 1975, an AN/SQR-19 Tactical Towed Array Sonar Advanced Development Model contract was awarded to General Electric Company on a competitive basis. In May 1976, at-sea tests of prototype AN/SQR-19 acoustic modules [ ] Based on these results and on extensive experience gained from the AN/SQR-15 Towed Array Surveillance System and submarine towed array system operations, authorization was granted by the Office of the Secretary of Defense to transition the AN/SQR-19 Tactical Towed Array Sensor program to engineering development in August 1976. During FY 1978, the AN/SQR-19 development effort was restructured to take further advantage of Navy standard building blocks and strengthen the Navy and contractor management teams. Since that restructuring, all program milestones have been met on time and within budget. In FY 1979, the restructured program was documented in an update of Decision Coordinating Paper 92. The restructured AN/SQR-19 program resulted in contracts being awarded to General Electric to proceed with full scale development in late FY 1979. Three engineering development models were pursued. In April 1980, at-sea tests of a full aperture brassboard AN/SQR-19 array and telemetry receiver were conducted [ ]. The array and telemetry system performed well, meeting or exceeding all performance requirements. Throughout FY 1980 and FY 1981, AN/SQR-19 hardware and computer software development, and test and integration continued in plant. AN/SQR-19 factory tests on shipboard electronics, handling and storage equipment and the tow cable and array subsystems have been completed. A complete AN/SQR-19 engineering development model was delivered to the Navy in October 1981 for shipboard installation aboard the USS MOOSBRUGGER (DD-980) leading to technical and operational evaluation.

Program Element: 64713N
DoD Mission Area: 233 - Anti-Submarine Warfare

Title: Tactical Towed Array Sonar
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Planned Program: The AN/SQR-19 engineering development model [redacted]. A technical evaluation will begin during the last half of FY 1982 to verify that performance thresholds are met. Pre-production testing at the prime contractor's facilities will be initiated.

3. (U) FY 1983 Planned Program: AN/SQR-19 pre-production testing [redacted]

4. (U) FY 1984 Planned Program: Develop system modification to correct deficiencies identified during technical and operational evaluation and to incorporate mandatory upgrades to government furnished equipment.

5. (U) Milestones:

		Date
a.	Defense Systems Acquisition Review Council I	May 1973
b.	Defense Systems Acquisition Review Council II	Jul 1976
c.	Awarded Engineering Development Contract	Dec 1977
d.	Department of the Navy Systems Acquisition Review Council	Mar 1979
e.	Complete Test Ship Installation	[redacted]
f.	Commence Technical Evaluation	[redacted]
g.	Commence Operational Evaluation	[redacted]
h.	Complete Initial Operational Test and Evaluation	[redacted]
i.	Approval for Service Use	[redacted]
j.	Defense Systems Acquisition Review Council III	[redacted]
k.	First Production Delivery	[redacted]

*Dates in parentheses are as shown in the FY 1982 Descriptive summary. Changes result from the following: the schedule for the AN/SQR-19 prototype [redacted] testing was definitized in early FY 1981. The AN/SQR-19 schedule was also affected by the requirement to accommodate the installation and test of the AN/SQS-53B and ASW Control System. Approval for service use and Defense Systems Acquisition Review Council III were advanced from the original conservative schedule due to excellent development progress.

Program Element: 64713N
DoD Mission Area: 233 - Anti-Submarine Warfare
Title: Tactical Towed Array Sonar
Budget Activity: 4 - Tactical Programs

(U) Test and Evaluation Data:

1. (U) Development Test and Evaluation: There have been many past tests at sea from earlier towed array sonar systems (AN/SQR-15, AN/SQR-18). General Electric has been selected as the contractor for the TACTAS, AN/SQR-19. Gould (CID) is developing the array, winch and handling system. Initial at-sea tests in May 1976, in the USS GLOVER (FF 1098, ex-AGFF 1) addressed sonar self-noise. Superior array self-noise performance was demonstrated, using prototype array modules, during a sea test in 1980.

2. (U) Operational Test and Evaluation: Commander Operational Test and Evaluation Force will conduct an operational evaluation of the AN/SQR-19 in order to determine the operational effectiveness and operational suitability of the Engineering Development Model (EDM).

The operational evaluation will consist of approximately 600 hours of free play and controlled runs. The results of the operational evaluation will be used by the Chief of Naval Operations to consider approval for service use and to support the production milestone (DSARC III) decision. Follow-on operational test and evaluation will be conducted.

3. (U) Systems Characteristics:

Parameter	Objective	Demonstrated
Array length	[redacted]	To be demonstrated during Technical Evaluation and Operational Evaluation (1982)
Max Cable Length		
Max Detection Range		
Max Detection Speed		
Max Survival Speed		
Stream and Recovery Time	75 minutes	

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64714N
DOD Mission Area: 235 - Naval Warfare Support

Title: Air Warfare Training Devices
Budget Activity: 4 - Tactical Program

(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	13,681	27,889	20,089	6,572	Continuing	Continuing
W1110	CH-53E Visual System Trainer	3,044	0	0	0	0	8,661
W1112	SH-60B Trainers	10,637	27,889	20,089	6,572	1,035	66,222

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program meets requirements of the Chief of Naval Operations and Fleet Commanders for development of flight simulator capabilities which offer safe flight training, more rapid accomplishment of training, maintenance of flying proficiency at less cost, reduced capital investment in operational aircraft used for training, and training in operation and maintenance of new weapon systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Under project W1112 SH-60B TRAINERS, functional descriptions and performance specifications will be completed, contracts awarded, functional designs completed and fabrication started for the Weapons Tactics Trainer and the Operational Flight Trainer and maintenance trainers. As this is a continuing program, the above funding includes outyear escalation and encompasses all work or development phases currently planned 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 reduction of 126 was the result of undistributed Congressional decrements. The FY 1982 reduction of 418 resulted from the FY 1982 budget amendment. The FY 1983 increase of 20,089 is necessary to purchase required spares and other support items normally funded in APN, but now requiring RDT&E funding.
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(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	5,617	13,807	28,307	0	Continuing	Continuing
W1110	CH-53E Visual System Trainer	5,617	3,071	0	0	0	8,688
W1112	SH-60B Trainer	0	10,736	28,307	0	0	39,043

Program Element: 64714N
DOD Mission Area: 235 - Naval Warfare Support

Title: Air Warfare Training Devices
Budget Activity: 4 - Tactical Program

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
APN	0	44,687	47,044	8,889	20,700	121,320
MILCON	0	12,500	9,000	--	--	21,500

Program Element: 64714N
DoD Mission Area: 235 - Naval Warfare Support

Title: Air Warfare Training Devices
Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for prototype development and first article procurement of air weapons training systems. The requirements of the program element are to develop and procure training devices which will provide or improve training in operation and maintenance of aviation equipment where training in live circumstances would be unsafe, reduce cost and improve efficiency. Use of these training devices properly integrated into existing courses of instruction will permit training personnel to better perform tasks and functions of new weapon systems, improve tactical/team/crew training in single and multi-system situations in all threat environments, reduce requirements for flying to provide certain training or to maintain proficiency of personnel, diagnose deficiencies in performance, and assure that new system developments are integrated in weapon systems training. Project No. W1112 SH-60B TRAINERS: The objective of this project is to develop: (1) a weapons tactics trainer for weapon system training for aircrew teams to successfully perform Anti-submarine Warfare/Anti-ship Surveillance and Targeting missions (2) an operational flight trainer for training the pilot and copilot in the operation and performance envelope of the SH-60B; and (3) a set of maintenance trainers for organizational level maintenance training.

(U) RELATED ACTIVITIES: Much of the technology involved in Project W1112, SH-60B has been applied under the U.S. Army Utility Tactical Transport Aircraft System (UTTAS) Helicopter Synthetic Flight Training System (UH-60), and the CH-53E maintenance trainers.

(U) WORK PERFORMED BY: Contractors IBM Federal Systems Division, Owego, N.Y., Sikorsky Aircraft Corporation, Stratford, Connecticut; Singer-Link Corporation, Houston, Texas; and McDonnell-Douglas Corporation, St. Louis, Missouri.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

.. (U) FY 1981 and Prior Accomplishments: Contract was awarded under W1112 to fabricate and test the Operational Flight Trainer, The Weapons Tactics Trainer, and a set of Naval Aviation Maintenance Trainers.

(U) FY 1982 Planned Program: Fabrication of the Operational Flight Trainer Weapons Tactics Trainer and the Naval Air .ntenance Trainers will commence and critical design reviews will be completed on all three traners.

3. (U) FY 1983 Planned Program : Under project W1112 SH-60B TRAINERS, fabrication of the maintenance trainers will be completed. The Operational Flight Trainer will be completed and in-plant testing will be completed. Fabrication of the Tactics Trainer will be near completion.

4. (U) FY 1984 Planned Program: Site acceptance testing for the trainers will be completed for the Operator and Maintenance Trainers. Operator and Maintenance Training for the trainers will be completed.

5. (U) Program to Completion: Incorporate changes to trainers as a result of Aircraft changes to maintain common configuration.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: Surface Warfare Training Device
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	34,428	41,746	32,838	46,258	Continuing	Continuing
Z1126	Surface Tomahawk Trainer	96	411	97	1,150	190	3,959 *
Z1127	FFG-7 Pierside Combat System Team Trainer	5,825	7,114	4,458	479	0	20,476 *
Z1128	MK 86 Operator/Team Trainer	2,369	1,790	0	0	0	4,659 *
Z1129	Auto Radar Tracking Trainer	1,255	300	0	0	0	1,555 *
Z1130	Naval Tactical Data System Laboratory	3,795	3,444	1,101	0	0	9,640 *
Z1131	Device 14E19/14E25/14E25A Modifications	404	2,121	2,242	478	0	5,645 *
Z1132	LAMPS MK III/SQQ-89 Acoustic Operator Trainer	6,677	4,932	5,224	980	1,917	19,740 *
Z1134	OUTBOARD Operator/Team Trainer	3,888	4,879	779	287	190	13,123 *
Z1138	Fire Control/Search Radar Maintenance Trainer	7	1,550	0	1,134	0	2,691 *
Z1140	Tactical Advanced Combat Direction and Electronic Warfare System Modifications	3,416	3,528	3,631	1,597	1,909	14,081 *
Z1268	AN/SQR-18A Sonar Operator/Team Trainer	400	1,271	1,717	327	0	3,715 *
Z1270	Universal/SQQ-89 Sonar Maintenance Trainer	0	0	2,188	12,629	10,287	25,104 *
Z1273	Tactical Action Officer Trainer	3,500	1,118	1,519	0	0	6,937 *
Z1274	Air Intercept/Anti-submarine Air Controller Trainer	990	3,963	3,276	1,665	0	9,894 *
Z1427	Training Device "14A12" Surface ASW Trainer	0	0	1,987	3,920	1,938	7,845 *
Z1428	AN/SQQ-23/BQR-20A Operator/Team Trainer	0	1,909	0	2,649	0	4,558 *
Z1430	ASW Tactical Team Trainer	0	0	0	478	10,699	11,177 *
Z1432	Universal Vertical Launcher System Maintenance Trainer	0	0	0	478	9,053	9,531 *
Z1433	Dynamic Subsystem Simulator	242	2,010	0	3,937	0	6,189 *
Z1434	Shipboard "Organic" Combat Systems Team Trainer	0	300	496	2,021	9,003	11,820 *
Z1435	Shiphandling Training System	348	199	718	5,258	6,714	13,237 *
Z1436	Surface Warfare Training Analysis	1,216	501	496	777	Continuing	Continuing
Z1454	Digital Radar Target Simulator	0	406	0	3,146	1,150	4,695 *
Z1605	Terrier New Threat Upgrade Team Trainer	0	0	2,909	2,868	8,391	14,168 *
S0791	Advanced Firefighting Trainer	(3,373) **	(1,200) **	(1,200) **	(7[illegible] **	0	(6,473)**

Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

* Quantity 1, prototype
** Planned funding transfer from PE 64703N. Not included in PE 64715N totals.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports the Chief of Naval Operations Surface Warfare Sponsor (OP-03) mission by improving readiness and training. Satisfies requirements of the Fleet and the Chief of Naval Education and Training for development of prototype surface warfare training devices to provide improved training thereby improving operational readiness, efficiency, and safety, and decreasing training time and cost.

(U) BASIS FOR THE FY 1983 RDT&E REQUEST: Continue the development of thirteen, and initiate development of three, surface warfare prototype training devices/training systems. Two projects, Z1128 and Z1129, will reach their Final Ready-for-Training capability during this period. These training systems support the continuing emphasis on achieving and maintaining high levels of operational readiness and reducing training cost through simulation. As this is a continuing Program Element, the above funding profile includes out-year escalation and encompasses all work or development phases now planned or anticipated in the individual projects 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 result of the following: The FY 1981 program was reduced by 1,962 by a change in scope of the program. There was significant reprogramming of funds within the program element which resulted in the following individual project changes: Surface Tomahawk Trainer funding decreased by 604, FFG-7 Pierside Combat System Team Trainer decreased by 1,140, Auto Radar Tracking Training decreased 1,145, Fire Control/Search Radar Maintenance Trainer decreased by 693, Tactical Advanced Combat Direction System and Electronic Warfare Modifications decreased by 1,300 and Tactical Action Officer Trainer increased by 500; all as a result of program restructuring. LAMPS MK III/SQQ-89 Acoustic Operator Trainer was increased by 1,811 for procurement of additional Government Furnished Equipment. Surface Warfare Training Analysis was increased by 916 to support additional analytical studies. The FY 1982 total program estimate is less than that shown in the FY 1982 Descriptive Summary by 5,289 as a result of the cancellation of Mobile Electronic Warfare Simulator releasing 1,817 and minor reprogramming and inflationary adjustments among the other projects. An alternative training method for Mobile Electronic Warfare Simulator has been identified. The FY 1983 total program estimate is less than that shown in the FY 1982 Descriptive Summary by 5,717 as a result of budget development including inflation estimates. Surface Tomahawk Trainer decreased by 1,150; FFG-7 Pierside Combat System Team Trainer decreased by 3,744; Device/14E19/14E25/14E25A Modifications increased 930; and Shiphandling Training System decreased by 5,426; all as a result of program restructuring. LAMPS MK III/SQQ-89 Acoustic Operator Trainer increased by 1,833 to purchase additional Government Furnished Equipment. Fire Control/Search Radar Maintenance Trainer decreased by 1,177; AN/SQQ-23/BQR-20A Operator Team Trainer decreased by 1,329; Dynamic Subsystem Simulator decreased by 3,070; Digital Radar Target Simulator decreased by 1,638; all as a result of postponing further development until FY 1984. Universal/SQQ-89 Sonar Maintenance Trainer increased by 1,677 and Air Intercept/Anti-Submarine Air Controller Trainer increased by 206 as a result of revised cost estimates. Universal Guided Missile Launching System Maintenance Trainer was cancelled releasing 511. An alternative training method has been identified. LSD-41 Propulsion Control Trainer decreased by 2,149 with development

Program Element: 64715N Title: Surface Warfare Training Device
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

postponed until FY 1986. The following are new starts: ASW Tactical Team Trainer for 478; and Terrier New Threat Upgrade Team Trainer for 2,909. The following were reduced by inflation estimates: Naval Tactical Data System Laboratory decreased 35; OUTBOARD Operator/Team Trainer decreased 23; Tactical Advanced Combat Direction and Electronic Warfare System Modifications decreased 115; AN/SQR-18A Sonar Operator/Team Trainer decreased 53; Tactical Action Officer Trainer decreased 46; Training Device "14A12" Surface ASW Trainer decreased 61; Shipboard Organic Combat Systems Team Trainer decreased 15; Surface Warfare Training Analysis decreased 15. The Surface Warfare Sponsor has accepted responsibility for the development of the Advanced Firefighting Trainer and will utilize the funds transferred from PE 64703N. Since the funding transferred has not been completed the PE 64715N funding totals do not reflect Project S0791 funds.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost	
	TOTAL FOR PROGRAM ELEMENT	10,000	36,390	47,035	38,555	Continuing	Continuing	
Z1126	Surface Tomahawk Trainer	0	700	2,444	1,247	203	4,594	
Z1127	FFG-7 Pierside Combat System Team Trainer	2,610	6,965	7,400	714	1,426	19,115	*
Z1128	MK 86 Operator/Team Trainer	500	2,400	1,903	0	0	4,803	*
Z1129	Auto Radar Tracking Trainer	0	2,400	303	0	0	2,703	*
Z1130	Naval Tactical Data System Laboratory	1,500	3,800	3,583	1,136	0	10,019	*
Z1131	Device 14E19/14E25/14E25A Modifications	400	406	2,150	1,312	1,500	5,768	*
Z1132	LAMPS MK III/SQQ-89 Acoustic Operator Trainer	250	4,866	5,092	3,391	8,563	22,162	*
Z1133	SQR-19 Operator/Team Trainer	0	49	0	0	0	49	*
Z1134	OUTBOARD Operator/Team Trainer	3,140	3,888	5,038	802	0	12,868	*
Z1138	Fire Control/Search Radar Maintenance Trainer	100	700	1,571	1,177	0	3,548	*
Z1140	Tactical Advanced Combat Direction System and Electronic Warfare Modifications	500	4,716	3,758	3,746	1,670	14,390	*
Z1268	AN/SQR-18A Sonar Operator/Team Trainer	0	500	1,288	1,770	341	3,899	*
Z1270	Universal Sonar Maintenance Trainer	0	0	0	511	20,737	21,248	*
Z1272	Universal Guided Missile Launching System Maintenance Trainer	0	0	0	511	8,190	8,701	*
Z1273	Tactical Action Officer Trainer	800	3,000	1,221	1,565	0	6,586	*
Z1274	Air Intercept/Anti-submarine Air Controller Trainer	0	1,000	4,073	3,070	2,013	10,156	*
Z1309	LSD-41 Propulsion Control Trainer	0	0	0	2,149	9,134	11,283	*
Z1426	Mobile Electronic Warfare Simulator	0	0	1,817	203	0	2,020	*
Z1427	Training Device "14AYY" Surface ASW Trainer	0	0	0	2,048	6,156	8,204	*

Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

Title		FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Z1428	AN/SQQ-23/BQR-20A Operator/Team Trainer	0	0	1,934	1,329	1,433	4,696 *
Z1433	Dynamic Subsystem Simulator	0	300	2,038	3,070	513	5,921 *
Z1434	Shipboard "Organic" Combat Systems Team Trainer	0	0	303	511	12,319	13,133 *
Z1435	Shiphandling Training System	0	400	201	6,144	8,820	15,565 *
Z1436	Surface Warfare Training Analysis	200	300	507	511	Continuing	Continuing
Z1454	Digital Radar Target Simulator	0	0	411	1,638	2,860	4,909 *

* Quantity 1, prototype

(U) OTHER APPROPRIATION FUNDS: (OPN) (Dollars in Thousands)

Title	Quantity	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Surface Tomahawk Trainer	(1)				1,467	0	1,467
FFG-7 Pierside Combat System Team Trainer	(7)			18,072	18,538	27,372	63,982
MK 86 Operator/Team Trainer	(1)		1,088	0	0	0	1,088
Auto Radar Tracking Trainer	(1)			1,156	0	0	1,156
Device 14E19/14E25/14E25A Modifications	(10)				5,111	4,982	10,093
LAMPS MK III/ SQQ-89 Acoustic Operator Trainer	(6)				7,722	37,898	45,620
OUTBOARD Operator/Team Trainer	(1)				5,377	0	5,377
Fire Control/Search Radar Maintenance Trainer	(18)				1,933	2,446	4,379
Tactical Advanced Combat Direction System and Electronic Warfare Modifications	(1)				4,695	4,888	9,583
AN/SQR-18A Sonar Operator/Team Trainer	(1)				3,942	0	3,942
Universal/SQQ-89 Sonar Maintenance Training System	(5)				9,403	31,353	40,756
Tactical Action Officer Trainer	(2)				7,867	0	7,867
Air Intercept/Antisubmarine Air Controller Trainer	(1)					3,623	3,623
Training Device "14A12" Surface ASW Trainer	(3)					12,436	12,436
AN/SQQ-23/BQR-20A Operator/Team Trainer	(2)					5,312	5,312

Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

Title		FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Digital Radar Target Simulator	(28)					9,570	9,570
Terrier New Threat Upgrade Team Trainer	(2)					4,783	4,783
Advanced Firefighting Trainer	(6)				3,068	16,625	19,693

Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support
Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element supports the CNO Surface Warfare Sponsor (OP 03) mission in relation to readiness and training. Specifically, this program element supports the development of those prototype surface warfare training devices which are not developed as part of a parent weapon system development process.

Program Objective Memorandum Serial 80-14 dated 14 March 1978 directed that prototype training devices, with minor exceptions, be developed within the RDT&E appropriation vice the procurement accounts. The surface warfare training devices within this program element reflect this new guidance. All have been planned to permit timely and efficient expenditure of funds.

1. (U) Project No. Z1126, SURFACE TOMAHAWK TRAINER: Will simulate operational TOMAHAWK weapon control consoles to provide individual and team training.

2. (U) Project No. Z1127, FFG-7 PIERSIDE COMBAT SYSTEM TEAM TRAINER: This device will provide refresher and replacement crew Antisubmarine Warfare, Anti-Air Warfare, Surface Warfare and multi-threat team training for FFG7 class combat system personnel. The device will utilize the ship and installed operational equipment as trainee stations. External environment, target/weapon signals and dynamic scenario generation will be developed within the trailerized (pierside) computational system. Appropriate target signals will be transmitted to the ship for stimulation of on-board operational equipment. Weapon signals and other selected data will be returned to the computer to permit problem evaluation.

3. (U) Project No. Z1128, MK 86 OPERATOR/TEAM TRAINER: The Gun Fire Control System MK 86 is a shipboard installed, gun fire control system to be used against surface, air and shore targets. The trainer will function as an independent operator, intra-team and Combat Information Center team trainer. For Combat Information Center team training the MK 86 equipments will be integrated into the Tactical Advanced Combat Direction and Electronic Warfare trainers. The trainers will consist of operational equipments stimulated by a simulation computer or a radar video simulator.

4. (U) Project No. Z1129, AUTO RADAR TRACKING TRAINER: This project will provide Automatic Radar Tracking systems training capability in the Tactical Advanced Combat Direction System and Electronic Warfare Trainer.

5. (U) Project No. Z1130, NAVAL TACTICAL DATA SYSTEM LABORATORY: The Naval Tactical Data System Laboratory will consist of a complex of simulated Naval Tactical Data System hardware controlled and stimulated by a digital computer. It will meet the growing demand for personnel qualified in Naval Tactical Data System console operation plus the rapidly increasing requirement for team, refresher, and transition training.

6. (U) Project No. Z1131, DEVICE 14E19/14E25/14E25A MODIFICATIONS: There are currently eight 14E19's (AN/SQS-26CX sonar simulator) and two 14E25/25A's (AN/SQS-53/53A sonar simulator) in use plus one additional 14E25A under procurement. Numerous discrepancies have been identified between the characteristics of the AN/SQS-26CX sonar and Device 14E19 requiring extensive simulator modifications. In addition, the Quick Reaction Fleet Improvement Program will significantly alter the characteristics

of both the AN/SQS-26CX and the AN/SQS-53/53A sonars. This project will respond to the impact of the Quick Reaction Fleet Improvement Program, define design changes, and update one 14E19 and one 14E25/25A to reflect the operational characteristics of the AN/SQS-26CX and the AN/SQS-53/53A sonars as required by the Quick Reaction fleet Improvement Program.

7. (U) Project No. Z1132, LAMPS MK III/SQQ-89 ACOUSTIC OPERATOR TRAINER: This trainer will consist of selected components of the shipboard operational AN/SQQ-28, AN/SQR-19, and AN/SQS-53B equipments, simulation/stimulation equipments, a simulation computer and appropriate instructional control capabilities. In the Tactical Advanced Combat Direction and Electronic Warfare installation the trainer will interact with the operational program and Tactical Data System display/control consoles in selected mockups and with the Tactical Advanced Combat Direction and Electronic Warfare environment generation/exercise control systems through a satellite buffer computer. Integrated into the Tactical Advanced Combat Direction and Electronic Warfare complex the trainer will support coordinated combat system team training in applications of the extended range antisubmarine warfare mission of the LAMPS III system and the integrated AN/SQQ-89 system. The training system will support operator training on the individual systems as well as team training when integrated. This effort has amalgamated the requirements formerly addressed in Project Z1133, AN/SQR-19 Operator/Team Trainer.

8. (U) Project No. Z1134, OUTBOARD OPERATOR/TEAM TRAINER: Selected surface ships will be receiving new systems designated OUTBOARD to assist in the task of detection, identification and tracking of non-radar targets which are a threat to the force. Integrated into the Tactical Advanced Combat Direction and Electronic Warfare complex this trainer will support team training for the OUTBOARD team operating in a simulated tactical environment with the combat system team. The trainer will include operationally equivalent operator consoles for the following six trainee positions: System Supervisor, Direction Finding Operator, High-Frequency and Very-High Frequency Operators (3), and Caliper Operator.

9. (U) Project No. Z1138, FIRE CONTROL/SEARCH RADAR MAINTENANCE TRAINER This trainer will teach fire control technicians to perform preventive and corrective maintenance on fire control radar systems. The trainer will be used to help the student verify each functional section's normal operation and when given a fault, perform fault isolation to the source of the malfunction, repair and test for proper operation.

10. (U) Project No. Z1140, TACTICAL ADVANCED COMBAT DIRECTION SYSTEM AND ELECTRONIC WARFARE MODIFICATIONS: The Tactical Advanced Combat Direction System and Electronic Warfare training complexes located at the Fleet Combat Training Centers Atlantic and Pacific provide facilities for integrated combat direction system team training. During the operational life of these complexes numerous add-on capabilities have been incorporated and frequent changes made to the Master Simulation Program to maintain currency with Fleet training requirements. The continued expansion of the complexes coupled with obsolescence of processing equipment have resulted in saturation of computer processor time. Therefore, the potential for further growth is negligible in the present configuration. Continuing requirements for integration of new combat system capabilities identified through the Navy Training Plan process mandates a complete system redesign to support initial qualification and/or replacement training in combat system operation, utilization, and applications for personnel assigned to shipboard combat system billets.

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11. (U) Project No. Z1268, AN/SQR-18A SONAR OPERATOR/TEAM TRAINER: Develop, for the purposes of training, a device which will generate signals simulating those received at the first unit of the AN/SQR-18A Sonar from targets and ambient noise under a variety of environmental conditions and modes of array operation. The device will be capable of operating independently to provide operator training or jointly with a 14A2 (Series) Device to provide sonar team and antisubmarine warfare team training.

12. ( ) Project No. Z1270, UNIVERSAL SONAR MAINTENANCE TRANER: This project will develop the AN/SQQ-89 Sonar Maintenance Training System to support AN/SQQ-89 sonar maintenance aboard FFG-7 and DD-963/CG-47 class ships. The development will provide all hardware/software/courseware to support the training requirements. The trainer suite will provide basic and advanced diagnostic training for Level I and Level II sonar maintenance personnel. The system will accommodate common equipment basic diagnostic, and system specific (AN/SQR-19, AN/SQQ-28, and AN/SQS-53B) training.

13. (U) Project No. Z1263, TACTICAL ACTION OFFICER TRAINER: This project will lead to development of a decision-making trainer for prospective ship department heads, executive officers and commanding officers to be placed at the Surface Warfare Officers School. The trainer will provide decision-making training in various single and multi-unit, multi-threat operational situations.

14. (U) Project No. Z1274, AIR INTERCEPT/ANTI-SUBMARINE AIR CONTROLLER TRAINER: Develop a trainer to provide training in controlling aircraft performing anti-submarine warfare, minelaying, search/rescue and other missions. Trainer will be integrated with existing Tactical Advanced Combat Development and Electronic Warfare complexes and will include twenty-two (22) student stations, an instructor station, and required stimulation/simulation hardware/software.

15. (U) Project No. Z1427, TRAINING DEVICE "14A12" SURFACE ASW TRAINER: This Surface Ship ASW trainer will be designed to provide operator/team training for non-Naval Tactical Data System ASW capable surface combatants in a mockup of a FF1052 class ship. Devices 14B19/24/27 will be interfaced with the 14A12. A common ocean model, improved problem display, and automated instructor controls will be provided. The device will simulate operational equipment wherever feasible in order to provide realistic operator/team training for multi-sensor ASW ships.

16. (U) Project No. Z1428, AN/SQQ-23/BQR-20A OPERATOR/TEAM TRAINER: This project will entail several inter-related tasks. First, to update the existing 14E24 devices to correct deficiencies and to reflect the current characteristics of the AN/SQQ-23A sonar. Second, to develop an AN/BQR-20A sonar operator/team trainer. Third, to provide an interface between the updated device 14E24, the new AN/BQR-20A trainer, and the 14A2 (or 14A2 replacement) to support team training.

17. (U) Project No. Z1430, ASW TACTICAL TEAM TRAINER: As a replacement for Device 14A6, the ASW Tactical Team Trainer will be a generic multi-threat, multi-platform procedures, tactics, and command/control trainer which will support single unit to Battle Group training. The trainer will provide interactive command, control and communications training for combat systems teams and subteams as well as staff command and control personnel. Additionally, the trainer will support decision-making training for senior officers involved in the tactical command and control of battle group level operations. The trainer will encompass state-

of-the-art digital microprocessors tied together to provide generic representations of all existing and projected air, surface, and subsurface platforms in any combination through the year 2005 and beyond.

18. (U) Project No. Z1432, UNIVERSAL VERTICAL LAUNCHER SYSTEM MAINTENANCE TRAINER: The technological advances incorporated into the new Vertical Launch System equipment result in new skill and knowledge requirements for the Navy technicians charged with onboard maintenance. Maintenance training systems incorporating modern educational technology must be developed which support the operational readiness of the fleet through improved maintenance capability. The new development Vertical Launch System Maintenance Training System will include all supporting hardware, software and courseware.

19. (U) Project No. Z1433, DYNAMIC SUBSYSTEM SIMULATOR: The Dynamic Subsystem Simulator for the Combat System Maintenance Training Facility at Mare Island, Vallejo, California is a software simulation of combat system functional responses to support maintenance training. This task is essentially an upgrading of software to accommodate maintenance training for the FFG-7 Class combat system.

20. (U) Project No. Z1434, SHIPBOARD "ORGANIC" COMBAT SYSTEM TEAM TRAINER: CNO letter Ser 03/212282 of 12 December 1977 identified the need for both pierside and organic trainers to support the spectrum of combat systems team training. The prototype pierside trainer commenced development in December 1980. Further evolution of the "On Board" concept is necessary to develop the required "organic" combat systems team training capability within surface combatants not yet designed.

21. (U) Project No. Z1435, SHIPHANDLING TRAINING SYSTEM: This task will develop an integrated shiphandling training system providing appropriate basic, advanced and refresher level training throughout the career cycle of all officers and enlisted personnel involved in shiphandling. On-going analysis efforts will identify and define in detail the specific training equipment and associated curriculum needed to provide the required training. Prior training experience, including the Computer Aided Operations Research Facility at Kings Point, and results of the preliminary training analysis indicate that development of a sophisticated shiphandling training device as part of the total training system will be required. The analysis indicates that this device will consist of a generic bridge mockup, a Computer Image Generation visual display (day and night) system, a radar display generation system, a computer system for problem generation and appropriate instructional control equipment. Training scenarios will include as examples coming alongside, maintaining station and departure, underway replenishment evolutions, entering and leaving port, piloting in restricted waters, conning in a channel, collision avoidance/rules of the road training and emergency shiphandling. The visual generation system will depict multiple contacts, shore line/shore scape and appropriate navigational aids/hazards within a dynamic (real time) environment.

22. (U) Project No. Z1436, SURFACE WARFARE TRAINING ANALYSIS: This is a continuing program to conduct front end analysis of specific training problems to include definition of requirements/shortfalls, training objective(s) and student loading. Identify alternate solutions with related cost/training effectiveness tradeoffs.

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23. (U) Project No. Z1454, DIGITAL RADAR TARGET SIMULATOR: Provide basic Air Intercept Control qualification and training to permit the trainee to learn and practice control of various simulated operational aircraft. This device will comprise radar and Identification Friend/Foe simulation equipment (including a digital computer), and an Instructor Control Console. The device will generate up to 20 targets representing the position, motion and size characteristics of any combination of air and surface radar targets. Simultaneous simulation of the characteristics of one air search and one surface search radar will be provided. Ownship's motion and the effects of target range/aspect, wind, current set/drift and earth's curvature will be simulated.

24. (U) Project No. Z1605, TERRIER NEW THREAT UPGRADE TEAM TRAINER: The subject trainer, when integrated into the existing Tactical Advanced Combat Direction System and Electronic Warfare complexes, will provide means for dynamic team training in skills essential for the qualification operation and operational employment of the Terrier New Threat Upgrade system in a multi-unit, multi-threat environment. The current Tactical Advanced Combat Direction System and Electronic Warfare design cannot support Terrier New Threat Upgrade Training.

25. (U) Project No. S0791, ADVANCED FIRE FIGHTING TRAINER: The device will be installed in a two story building which will duplicate the engineering space and berthing/storage space found onboard ship. The fires will be perceived by the trainee as being realistic and found under the same circumstances as would be characteristic afloat, except that non-toxic, non-pollutant smoke will be introduced only at specific points in training to meet specific objectives rather than being endemic to the fire. The fires will be LP gas fueled, non-pollutant and capable of rapid ignition and realistic extinguishment. The fires will display all the typical characteristics of Class A, B, and C fires and all the characteristics of correct and incorrect extinguishment techniques.

(U) RELATED ACTIVITIES: Program Elements 62757N (Human Factors and Simulation Technology) and 63733N (Simulation and Training Devices) develop and demonstrate technology for application to this program.

(U) WORK PERFORMED BY: In-House: Naval Training Equipment Center, Orlando, Florida. Contractors: Gould Incorporated, Melville, New York; Cubic Corporation, San Diego, California; Honeywell Incorporated, West Covina, California; Tracor Incorporated, Austin, Texas; Grumman Aircraft Company, Bethpage, New York; Sperry Corporation, Reston, Virginia; Hughes Aircraft Company, Fullerton, California; American Communications Incorporated, Sperry Systems, Great Neck, New York; AAI Corporation, Cockeysville, Maryland.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In general, 1981 and prior accomplishments include in-house training analysis/engineering analysis and contract monitoring. Significant additional accomplishments are itemized below and identified in accordance with the project numbers and subparagraph numbers established within the Detailed Background and Description section.

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(1) (U) Project No. Z1126, SURFACE TOMAHAWK TRAINER: Conduct analyses to determine functional baseline.

(2) (U) Project No. Z1127, FFG-7 PIERSIDE COMBAT SYSTEM TEAM TRAINER: Navy Decision Coordinating Paper was approved in September 1980. Prototype development contract was awarded December 1980 to AAI Corporation.

(3) (U) Project No. Z1128, MK 86 OPERATOR/TEAM TRAINER: Prototype development contract was awarded to Gould, Inc. in September 1980. Navy Decision Coordinating Paper was approved February 1981. Draft Training Equipment Test and Evaluation Plan submitted March 1981.

(4) (U) Project No. Z1129, AUTO RADAR TRACKING TRAINER: Navy Decision Coordinating Paper was approved July 1981.

(5) (U) Project No. Z1130, NAVAL TACTICAL DATA SYSTEM LABORATORY: Development contract was awarded to Cubic Corporation in March 1980. Navy Decision Coordinating Paper approved September 1980. Design Review was completed January 1981.

(6) (U) Project No. Z1131, DEVICE 14E19/14E25/14E25A MODIFICATIONS: Awarded contract February 1980 to conduct detailed comparison of the characteristics of the subject devices versus those updated AN/SQS-26CX/53 sonars that they simulate. Navy Decision Coordinating Paper was approved July 1981.

(7) (U) Project No. Z1132, LAMPS MK III/SQQ-89 ACOUSTIC OPERATOR TRAINER: Study contract to conduct detailed training analysis was awarded March 1980. A software contract to develop an ocean environment model was awarded in June 1980. Initial Navy Decision Coordinating Paper has been submitted.

(8) (U) Project No. Z1134, OUTBOARD OPERATOR/TEAM TRAINER: Development contract for prototype device awarded June 1980. Navy Decision Coordinating Paper was approved in April 1981.

(9) (U) Project No. Z1138, FIRE CONTROL/SEARCH RADAR MAINTENANCE TRAINER: A contract was awarded to Hughes Aircraft Company in February 1980 to collect/analyze data pertaining to the existing and planned fire control radar population. The end product of this phase will be a detailed description of a cost effective Fire Control/Search Radar Maintenance trainer suitable for use and the Fire Control Technician "A" School. Navy Decision Coordinating Paper was approved June 1981.

(10) (U) Project No. Z1140, TACTICAL ADVANCED COMBAT DIRECTION SYSTEM AND ELECTRONIC WARFARE MODIFICATIONS: A contract was awarded in September 1980 to develop a prototype Radar Video Simulation unit. Navy Decision Coordinating Paper was approved in April 1981.

(11) (U) Project No. Z1268, AN/SQR-18A SONAR OPERATOR/TEAM TRAINER: Initial Navy Decision Coordinating Paper submitted September 1981.

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(12) (U) Project No. Z1270, UNIVERSAL/SQQ-89 SONAR MAINTENANCE TRAINER: Initial Navy Decision Coordinating Paper submitted August 1981.

(13) (U) Project No. Z1273, TACTICAL ACTION OFFICER TRAINER: Study contract was awarded April 1980 to American Communications to develop functional specification. Initial Navy Decision Coordinating paper has been prepared and submitted for review.

(14) (U) Project No. Z1274, AIR INTERCEPT/ANTI-SUBMARINE AIR CONTROLLER TRAINER: Navy Decision Coordinating Paper was approved in April 1981.

(15) (U) Project No. Z1433, DYNAMIC SUBSYSTEM SIMULATOR: Continuing in-house analysis effort to develop functional baseline.

(16) (U) Project No. Z1434, SHIPBOARD "ORGANIC" COMBAT SYSTEM TEAM TRAINER: Study contract awarded to Advanced Technology Incorporated in May 1981 to establish specific training requirements for emerging combat system operators/teams.

(17) (U) Project No. Z1435, SHIPHANDLING TRAINING SYSTEM: Continue in-house analysis to develop a functional baseline for the training system.

(18) (U) Project No. Z1436, SURFACE WARFARE TRAINING ANALYSIS: Continuing analysis efforts as required.

(19) (U) Project No. S0791, ADVANCED FIRE FIGHTING TRAINER: Four fire installation during FY 1980. Test and evaluation of four fire unit complete August 1981.

2. (U) FY 1982 Program:

(1) (U) Project No. Z1126, SURFACE TOMAHAWK TRAINER: Procure Government Furnished Equipment, consisting of a Weapons Control Console.

(2) (U) Project No. Z1127, FFG-7 PIERSIDE COMBAT SYSTEM TEAM TRAINER: Complete Design Review March 1982. Commence hardware fabrication. Conduct preliminary testing of signal generation and interface modules with operational equipment.

(3) (U) Project No. Z1128, MK 86 OPERATOR/TEAM TRAINER: Complete fabrication March 1982. Complete Acceptance Testing June 1982. Initial Ready-for-Training Date scheduled July 1982.

(4) (U) Project No. Z1129, AUTO RADAR TRACKING TRAINER: Completed Design Review October 1981. Completed fabrication July 1982.

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(5) (U) Project No. Z1130, NAVAL TACTICAL DATA SYSTEM LABORATORY: Continue fabrication of student suites and course/scenarios production.

(6) (U) Project No. Z1131, DEVICE 14E19/14E25/14E25A MODIFICATIONS: Complete Design Review December 1981. Complete fabrication August 1982.

(7) (U) Project No. Z1132, LAMPS MK III/SQQ-89 ACOUSTIC OPERATOR TRAINER: A December 1981 contract is planned for prototype development. Commence trainer system design.

(8) (U) Project No. Z1134, OUTBOARD OPERATOR/TEAM TRAINER: Complete Design Review January 1982. Commence fabrication effort.

(9) (U) Project No. Z1138, FIRE CONTROL/SEARCH RADAR MAINTENANCE TRAINER: Program restructured as a result of FY 1983 Program Decision Memorandum. Plans are to reinstitute this project in FY 1984. FY 1982 dollars are being reprogrammed.

(10) (U) Project No. Z1140, TACTICAL ADVANCED COMBAT DIRECTION AND ELECTRONIC WARFARE MODIFICATIONS: Contract award for prototype development scheduled for March 1982. Design Review scheduled September 1982.

(11) (U) Project No. Z1268, AN/SQR-18A SONAR OPERATOR/TEAM TRAINER: Contract award for prototype development scheduled March 1982. Design Review to be completed in August 1982.

(12) (U) Project No. Z1273, TACTICAL ACTION OFFICER TRAINER: Develop computational system. Initiate software development and hardware fabrication. Design Review scheduled in April 1982.

(13) (U) Project No. Z1274, AIR INTERCEPT/ANTI-SUBMARINE AIR CONTROLLER TRAINER: Award development contract for prototype January 1982. Complete Design Review September 1982.

(14) (U) Project No. Z1428, AN/SQQ-23/BQR-20A OPERATOR/TEAM TRAINER: Program restructured. Plans are to reinstitute this project in FY 1984. FY 1982 dollars are being reprogrammed.

(15) (U) Project No. Z1433, DYNAMIC SUBSYSTEM SIMULATOR: Project cancelled as a result of FY 1983 Program Decision Memorandum. FY 1982 dollars being reprogrammed.

(16) (U) Project No. Z1434, SHIPBOARD "ORGANIC" COMBAT SYSTEM TEAM TRAINER: Continue study efforts. Initial Operational Requirement and Navy Decision Coordinating Paper submitted.

(17) (U) Project No. Z1435, SHIPHANDLING TRAINING SYSTEM: Complete analysis effort. Develop functional baseline and

specification for prototype.

(18) (U) Project No. Z1436, SURFACE WARFARE TRAINING ANALYSIS: Continue analyses efforts as required.

(19) (U) Project No. Z1454, DIGITAL RADAR TARGET SIMULATOR: Program restructured as a result of FY 1983 Program Decision Memorandum. Plans are to reinstitute this project in FY 1984. FY 1983 dollars are being reprogrammed.

(20) (U) Project No. Z1605, TERRIER NEW THREAT UPGRADE TEAM TRAINER: Not applicable.

(21) (U) Project No. S0791, ADVANCED FIRE FIGHTING TRAINER: Installation, test and evaluation of additional fires.

3. (U) FY 1983 Planned Program:

(1) (U) Project No. Z1126, SURFACE TOMAHAWK TRAINER: Contract award for development effort scheduled for January 1983.

(2) (U) Project No. Z1127, FFG-7 PIERSIDE COMBAT SYSTEM TEAM TRAINER: Complete fabrication in March 1983. Conduct acceptance testing.

(3) (U) Project No. Z1128, MK 86 OPERATOR/TEAM TRAINER: Final Ready-for-Training scheduled July 1983.

(4) (U) Project No. Z1129, AUTOMATIC RADAR TRACKING TRAINER: Final Ready-for-Training scheduled April 1983.

(5) (U) Project No. Z1130, NAVAL TACTICAL DATA SYSTEM LABORATORY: Complete fabrication and testing July 1983. System to be Ready for Training September 1983.

(6) (U) Project No. Z1131, DEVICE 14E19/14E25/14E25A MODIFICATIONS: Complete in-plant and on-site testing by May 1983.

(7) (U) Project No. Z1132, LAMPS MK III/SQQ-89 ACOUSTIC OPERATOR TRAINER: Continue trainer system design and fabrication. Program Sponsor Design Review June 1983.

(8) (U) Project No. Z1134, OUTBOARD OPERATOR/TEAM TRAINER: Continue fabrication efforts. Start in-plant testing.

(9) (U) Project No. Z1140, TACTICAL ADVANCED COMBAT DIRECTION AND ELECTRONIC WARFARE MODIFICATIONS: Continue fabrication efforts.

(10) (U) Project No. Z1268, AN/SQR-18A SONAR OPERATOR/TEAM TRAINER: Continue fabrication August 1983.

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(11) (U) Project No. Z1270, UNIVERSAL/SQQ-89 MAINTENANCE TRAINER: Award prototype development contract December 1982. Commence design development.

(12) (U) Proect No. Z1273, TACTICAL ACTION OFFICER TRAINER: Complete fabrication December 1982. Complete acceptance testing February 1983. Initial Ready-for-Training Date scheduled April 1983.

(13) (U) Project No. Z1274, AIR INTERCEPT/ANTI-SUBMARINE AIR CONTROLLER: Continue fabrication efforts.

(14) (U) Project No. Z1427, TRAINING DEVICE 14A12 SURFACE ASW TRAINER: Complete Design Review June 1983.

(15) (U) Project No. Z1434, SHIPBOARD "ORGANIC" COMBAT SYSTEM TEAM TRAINER: Continue study efforts.

(16) (U) Project No. Z1435, SHIPHANDLING TRAINING SYSTEM: Contract award scheduled January 1983.

(17) (U) Project No. Z1436, SURFACE WARFARE TRAINING ANALYSIS: Contract for analysis efforts as required.

(18) (U) Project No. Z1605, TERRIER NEW THREAT UPGRADE TEAM TRAINER: Contract award scheduled September 1983.

(19) (U) Project No. S0791, ADVANCED FIRE FIGHTING TRAINER: Complete test and evaluation of complete system.

4. (U) FY 1984 Planned Program:

(1) (U) Project No. Z1126, SURFACE TOMAHAWK TRAINER: Complete fabrication in September 1984.

(2) (U) Project No. Z1127, FFG-7 PIERSIDE COMBAT SYSTEM TEAM TRAINER: Initial Ready-for-Training Date scheduled for October 1983. Conduct Training Effectiveness Evaluation February 1984.

(3) (U) Project No. Z1130, NAVY TACTICAL DATA SYSTEM LABORATORY: Conduct Training Effectiveness Evaluation April 1984.

(4) (U) Project No. Z1131, DEVICE 14E19/14E25/14E25A MODIFICATIONS: Initial Ready-for-Training Date scheduled October 1983.

(5) (U) Project No. Z1132, LAMPS MK III/SQQ-89 ACOUSTIC OPERATOR TRAINER: Complete fabrication June 1984.

(6) (U) Project No. Z1134, OUTBOARD OPERATOR/TEAM TRAINER: Initial Ready-for-Training Date scheduled February 1984.

(7) (U) Project No. Z1138, FIRE CONTROL/SEARCH RADAR MAINTENANCE TRAINER: There is a POM-84 Issue to restructure this

project.

(8) (U) Project No. Z1140, TACTICAL ADVANCED COMBAT DIRECTION AND ELECTRONIC WARFARE MODIFICATION: Continue fabrication.

(9) (U) Project No. Z1268, AN/SQR-18A SONAR OPERATOR/TEAM TRAINER: Complete testing October 1983. Initial Ready-for-Training Date scheduled December 1983.

(10) (U) Project No. Z1270, UNIVERSAL SONAR MAINTENANCE TRAINER: Complete Design Review November 1983. Continue fabrication.

(11) (U) Project No. Z1274, AIR INTERCEPT/ANTI-SUBMARINE AIR CONTROLLER TRAINER: Complete fabrication November 1983. Initial Ready-for-Training Date scheduled January 1984.

(12) (U) Project No. Z1427, TRAINING DEVICE "14A12" SURFACE ASW TRAINER: Complete fabrication and testing. Initial Ready-for-Training Date scheduled September 1984.

(13) (U) Project No. Z1428, AN/SQQ-23/BQR-20A OPERATOR/TEAM TRAINER: There is a POM-84 Issue to restructure this project.

(14) (U) Project No. Z1430, ASW TACTICAL TEAM TRAINER: Contract award scheduled December 1983. Complete Design Review August 1984.

(15) (U) Project No. Z1432, UNIVERSAL VERTICAL LAUNCHER SYSTEM MAINTENANCE TRAINER: Develop engineering specifications.

(16) (U) Project No. Z1433, DYNAMIC SUBSYSTEM SIMULATOR: FY 1984 dollars are being reprogrammed.

(17) (U) Project No. Z1434, SHIPBOARD "ORGANIC" COMBAT SYSTEM TEAM TRAINER: Complete study effort. Develop functional baseline.

(18) (U) Project No. Z1435, SHIPHANDLING TRAINING SYSTEM: Continue fabrication. Complete Design Review October 1983.

(19) (U) Project No. Z1436, SURFACE WARFARE TRAINING ANALYSIS: Contract for analysis efforts as required.

(20) (U) Project No. Z1454, DIGITAL RADAR TARGET SIMULATOR: There is a POM-84 Issue to restructure this project.

(21) (U) Project No. Z1605, TERRIER NEW THREAT UPGRADE TEAM TRAINER: Complete Design Review June 1984.

(22) (U) Project No. S0791, ADVANCED FIRE FIGHTING TRAINER: Prototype Final Ready-for-Training December 1983.

Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion:

(1) (U) Project No. Z1126, SURFACE TOMAHAWK TRAINER: Initial Ready-for-Training Date December 1984. Final Ready-for-Training December 1985.

(2) (U) Project No. Z1127, FFG-7 PIERSIDE COMBAT SYSTEM TEAM TRAINER: Final Ready-for-Training scheduled October 1984.

(3) (U) Project No. Z1130, NAVY TACTICAL DATA SYSTEM LABORATORY: Final Ready-for-Training scheduled October 1984.

(4) (U) Project No. Z1131, DEVICE 14E19/14E25/14E25A MODIFICATIONS: Final Ready-for-Training Date December 1984.

(5) (U) Project No. Z1132, LAMPS MK III/SQQ-89 ACOUSTIC OPERATOR TRAINER: Initial Ready-for-Training Date April 1985. Final Ready-for-Training Date April 1986.

(6) (U) Project No. Z1134, OUTBOARD OPERATOR/TEAM TRAINER: Final Ready-for-Training Date April 1985.

(7) (U) Project No. Z1140, TACTICAL ADVANCED COMBAT DIRECTION and ELECTRONIC WARFARE MODIFICATIONS: Initial Ready-for-Training Date March 1985. Final Ready-for-Training date May 1986.

(8) (U) Project No. Z1268, AN/SQR-18A SONAR OPERATOR/TEAM TRAINER: Final Ready-for-Training date December 1984.

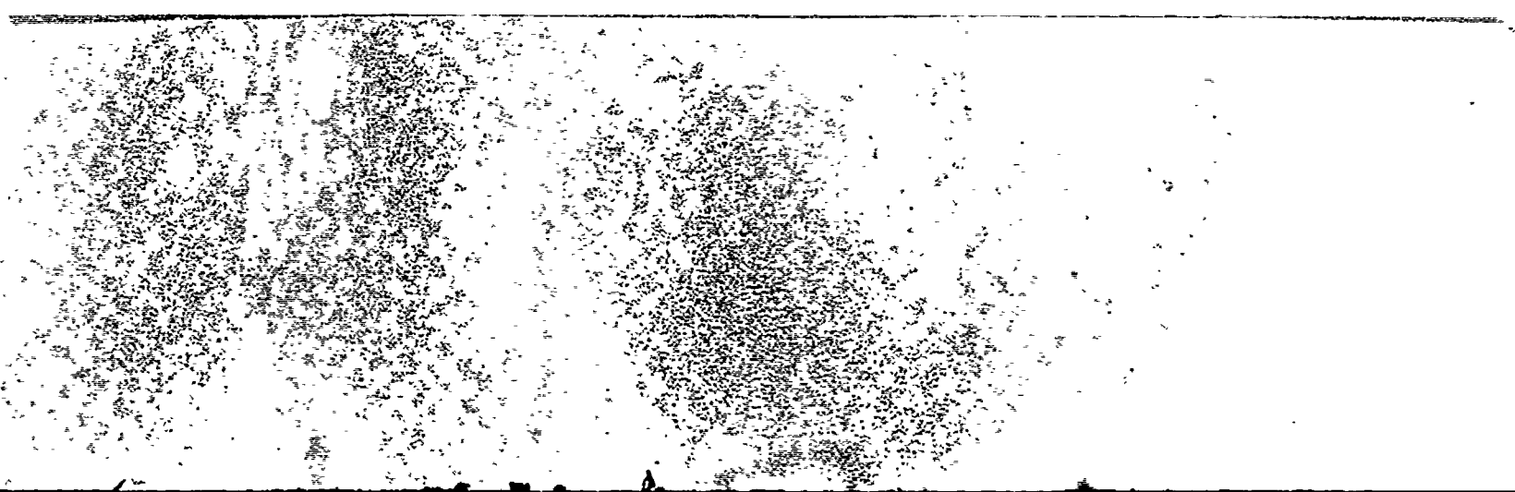
(9) (U) Project No. Z1270, UNIVERSAL/SQQ-89 SONAR MAINTENANCE TRAINER: Initial Ready-for-Training Date scheduled October 1985. Final Ready-for-Training date January 1987.

(10) (U) Project No. Z1274, AIR INTERCEPT/ANTI-SUBMARINE AIR CONTROLLER TRAINER: Initial Ready-for-Training Date scheduled January 1984. Final Ready-for-Training Date November 1984.

(11) (U) Project No. Z1427, TRAINING DEVICE "14A12" SURFACE ASW TRAINER: Final Ready-for-Training date September 1985.

(12) (U) Project No. Z1430, ASW TACTICAL TEAM TRAINER: Complete testing July 1986. Final Ready-for-Training date scheduled August 1987.

(13) (U) Project No. Z1432, UNIVERSAL VERTICAL LAUNCHER SYSTEM MAINTENANCE TRAINER: Complete testing FY 1987. Final Ready-for-Training date scheduled February 1988.



Program Element: 64715N Title: Surface Warfare Training Device
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(14) (U) Project No. Z1434, SHIPBOARD "ORGANIC" COMBAT SYSTEM TEAM TRAINER: Complete testing December 1987. Final Ready-for-Training date March 1989.

(15) (U) Project No. Z1435, SHIPHANDLING TRAINING SYSTEM: Final Ready-for-Training date July 1986.

(16) (U) Project No. Z1436, SURFACE WARFARE TRAINING ANALYSIS: Contining program. Contract analysis efforts as required.

(17) (U) Project No. Z1605, TERRIER NEW THREAT UPGRADE TEAM TRAINER: Complete testing September 1986. Final Ready-for-Training scheduled October 1987.

6. (U) Milestones: Not Applicable.

7. (U) Resource: Not Applicable.

Project: Z1127
Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: FFG-7 Pierside Combat System Team Trainer
Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Perry Class Pierside Combat System Team Trainer will provide pierside training in tactical combat operations for Combat Information Center and Sonar Control Room personnel of the FFG-7 ships. The trainer will consist of two basic elements: (1) two mobile vans housing computational system data/voice communications equipment and instructor problem control and monitor equipment; and (2) a carry-on complement of digital-to-analog and analog-to-digital conversion and interface equipments to provide data/signal sampling and injection interface with on-board sensors and weapon control systems. The tactical environment including air, surface and subsurface threat conditions will be presented to the combat system teams through stimulation of on-board sensor systems and by providing representative support vehicle derived data. Training exercises under instructor and computer software control will depict air, surface, subsurface and combined threats. All on-board radar, sonar and LAMPS I equipment (system design concepts will permit future expansion to LAMPS III capability) will be stimulated with threat representative target data. Weapon control systems will be sampled, the weapon trajectory and resultant damage assessment modeled with appropriate weapon system status signals generated to drive operator display equipment. The total weapon system software programs will be utilized without modifications to insure continuing validity of results and eliminate time lag following operational program modifications.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Training Equipment Center, Orlando, Florida. Contractor: AAI Corporation, Cockeysville, Maryland.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: Prototype development contract was awarded December 1980. Navy Decision Coordinating Paper approved September 1980.

2. (U) FY 1982 Program: Complete Design Review March 1982. Commence hardware fabrication. Conduct preliminary testing of signal generation and interface modules with operational equipment.

3. (U) FY 1983 Planned Program: Complete hardware fabrication. Complete software design, coding and initial testing. Complete contractor conducted hardware/software integration testing.

4. (U) FY 1984 Planned Program: Complete hardware/software integration. Initial Ready-for-Training Date scheduled for October 1983.

5 (U) Program to Completion: Following contractual acceptance the trainer will be designated Provisionally Ready-for-Training and made available to the user command for scheduled training. Interim support period completed in the fourth quarter FY

Project: Z1127
Program Element: 64715N
DoD Mission Area: 235 - Naval Warfare Support

Title: FFG-7 Pierside Combat System Team Trainer
Title: Surface Warfare Training Device
Budget Activity: 4 - Tactical Programs

1984. Final Ready-for-Training scheduled October 1984.

6. (U) Milestones: Not applicable.

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Escimate	Additional to Completion	Total Estimated Cost
Z1127	FFG-7 Pierside Combat System Team Trainer	5,825	7,114	4,458	479	0	20,476

Project: Z1132 Title: LAMPS MK III/AN/SQQ-89 Acoustic Operator Trainer
Program Element: 64715N Title: Surface Warfare Training Device
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The LAMPS MK III Acoustic Operator/Team Trainer will provide dynamic training for achievement of the acoustic subsystem manipulative and interpretive skills required for designation as an Acoustic Sensor Operator; and to support training in acoustic subsystem operation and interpretation necessary for designation as an Air Tactical Control Officer. Installed as integrated satellite subsystems of the training complexes at Fleet Combat Training Centers Atlantic and Pacific, production units of the Acoustic Operator/Team Trainer will provide the simulated LAMPS MK III acoustic environment necessary to support surface ship operator and combat system team training in operation, utilization and tactical applications of the LAMPS MK III system. The projected design technique is to stimulate unmodified operational system components with appropriate simulation capability facilities with a continuing ability to support all training objectives in a timely and cost effective manner. The approach permits operational software program changes and/or hardware changes to be incorporated directly into the operational components of the trainer with little or no change to the synthetic environment generating capability. This effort will produce an operator/team trainer for LAMPS MK III shipboard personnel expanding on design concepts developed for land based test site training in equipment operation, data acquisition/interpretation and utilization in tactical combat exercises.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Training Equipment Center, Orlando, Florida. Contractors: Tracor Incorporated, Austin, Texas; Grumman Aircraft Company, Bethpage, New York.

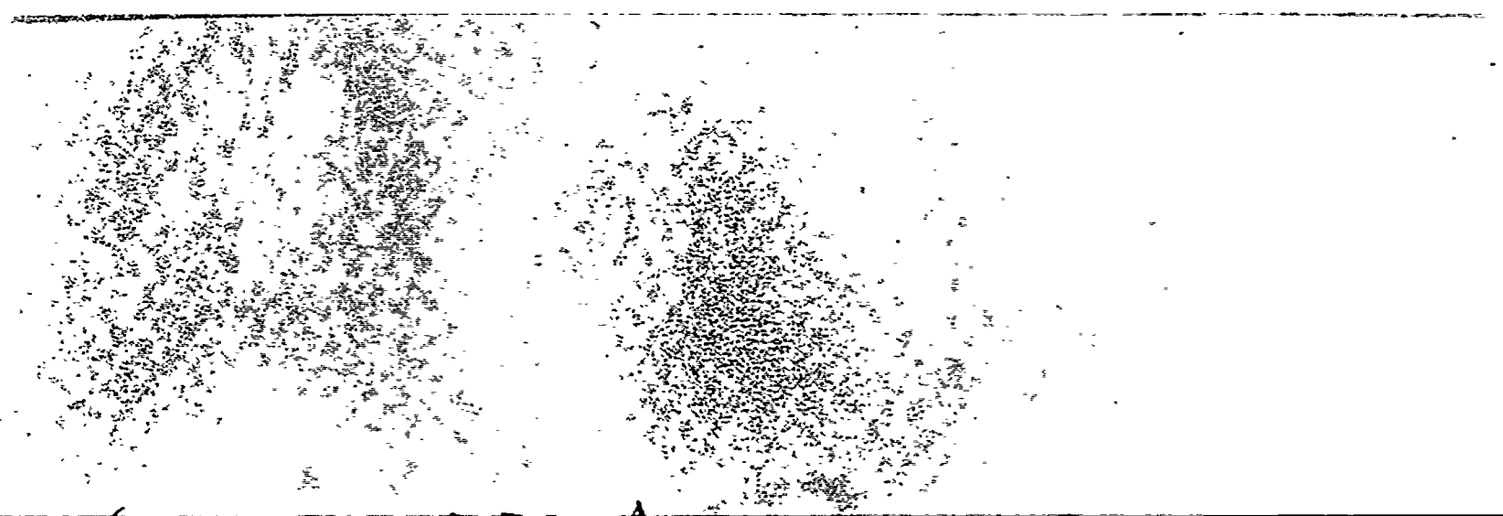
(U) PROGRAM ACCOMPLISNMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: An initial Navy Decision Coordinating Paper was submitted. Initiated a combined in-house /contractor effort to analyze the requirements associated with the AN/SQQ-89 system (including the AN/SQR-19, AN/SQQ-28, and AN/SQS-53B sonars) in March 1980. Initial software development contract was awarded in June 1980. An ocean model will be developed as part of these efforts. Specific training equipment requirements are being identified and specifications are under development.

2. (U) FY 1982 Programs: Contract award for the prototype trainer scheduled.

3. (U) FY 1983 Programs: The training system design will be completed with Design Review scheduled in June 1983. Trainer fabrication will commence.

4. (U) FY 1984 Planned Programs: Complete fabrication June 1984. Commence testing.



Project: Z1132 Title: LAMPS MK III/AN/SQQ-89 Acoustic Operator Trainer
Program Element: 64715N Title: Surface Warfare Training Device
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

5. (U) Program to Completion: In-plant testing will complete and Initial Ready-for-Training Date will be reached in the third quarter FY 1985. Final acceptance and delivery of Integrated Logistic support items will continue until the final Ready-for-Training date in the third quarter of FY 1986.

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
Z1132	LAMPS MK III/AN/SQQ-89 Acoustic Operator Trainer	6,677	4,932	5,224	980	1,917	19,740



FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64716N
Title: Submarine Warfare Training Devices
DoD Mission Area: 233 - Antisubmarine Warfare
Budget Activity: 4 - Tactical Programs

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

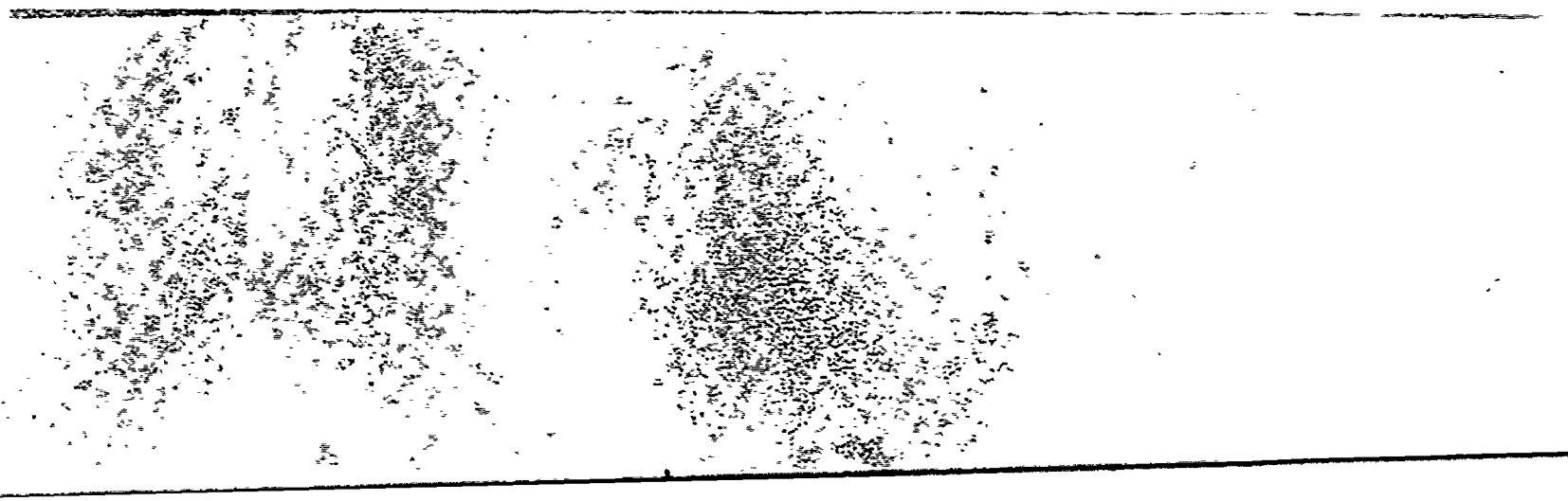
Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2,908	4,553	3,226	0	Continuing	Continuing
S0884	Submarine Advanced Reactive Tactical Training System	2,739	0	0	0	0	2,739 */**
X0953	Advanced Visual/Near Visual Electro-Optic Sensor Simulator	169	4,553	3,226	TBD	TBD	TBD */**

* Quantity 1, prototype
** The total estimated cost includes prior funding appropriated under PE64703N, Training Devices Prototype Development.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports the CNO Submarine Warfare Sponsor (OP 02) mission by improving readiness and training. Satisfies requirements of the Fleet and the Chief of Naval Education and Training for development of prototype submarine warfare training devices to provide improved training thereby improving operational readiness and efficiency, safety, and decreasing training time and cost.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue or complete development of two subaarine warfare prototype training devices/training systems. These training systems support the continuing emphasis on achieving and maintaining high levels of operational readiness and reducing training cost through simulation. 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 Desriptive Summary are as follows: For 1981 Project S0884 was increased by 1,347 to expedite completion and X0953 was reduced by 3,426 to meet a high priority requirement, which is being paid back in FY 1983 (2,012). In FY 1982, Congress did not appropriate funds for the completion of Project S0884. The decrease of 86 in project X0953 is due to revision of escalation estimates. The FY 1983 funding displays an increase of 3,024 dollars for Project X0953.



Program Element: 64716N
DoD Mission Area: 233 - Antisubmarine Warfare
Title: Submarine Warfare Training Devices
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	4,987	6,470	1,221	Continuing	Continuing
S0884	Submarine Advanced Reactive Tactical Training System (SMARTTS)	0	1,392	1,831	1,019	510	*7,112
	Quantity					Prototype	(1)
X0953	Advanced Visual/Near Visual Electro-Optic Sensor Simulator (AVEOSS)	0	3,595	4,639	202	0	9,036
	Quantity					Prototype	(1)

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

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0884	Submarine Advanced Reactive Tactical Training System						
	OPN/BA-7	0	0	0	3,876	11,620	15,496
	Quantity				(2)	(6)	(8)
X0953	Advanced Visual/Near Visual Electro-Optic Sensor Simulator						
	OPN/BA-7	0	0	0	6,443	16,788	23,231
	Quantity				(1)	(3)	(4)

Program Element: 64716N
Title: Submarine Warfare Training Devices
DoD Mission Area: 233 - Antisubmarine Warfare
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element supports the Chief of Naval Operations Submarine Warfare Sponsor (OP 02) mission in relation to readiness and training. Specifically, this program element supports the development of those prototype submarine warfare training devices which are not developed as part of the parent weapon system development process.

Program Objective Memorandum Serial 80-14 dated 14 March 1978 directed that prototype training devices, with minor exceptions, be developed within the RDT&E appropriation instead of the procurement accounts. The submarine warfare training devices within this program element commenced in RDT&E (PE 64703N) and as a result of the new guidance transitioned to this program element (64716N) as of FY 1981.

1. (U) Project No. S0884, SUBMARINE ADVANCED REACTIVE TACTICAL TRAINING SYSTEM: This system will realistically generate real-time dynamic Antisubmarine Warfare training scenarios based on known weapon system capabilities, operational environment conditions and tactical guidelines of U.S. and potential threat forces. This capability will essentially duplicate, in software, a model of the tactical doctrine for each available U.S. and potential adversary platform for typical tactical encounters between the respective platforms. This training system will simulate nominal levels of competence by each platform to react to a variety of situations using standard doctrine and typical exceptions or departures from standard doctrine which are to be used under different mission priorities. In addition, accommodation will be made for the continuous computerized evaluation of performance and diagnostic placement of individuals and teams within the submarine fire control party environment in the Submarine Combat System Trainers.

2. (U) Project No. X0953, ADVANCED VISUAL/NEAR VISUAL ELECTRO-OPTIC SENSOR SIMULATOR: A training requirement exists to provide simulation of tactical Electromagnetic information/displays in submarine attack centers in order to train submarine personnel in properly utilizing this information to make correct tactical decisions. The Advanced Visual/Near Visual Electro-Optic Sensor Simulator will permit the detection of Electromagnetic energy which will be displayed and analyzed for the submarine Approach Officer and Officer of the Deck for use in further analyzing the tactical environment. Submarine periscopes and electromagnetic sensors (and sonars) will remain the primary means of target classification and identification. The primary mission assigned to SSN class submarines is anti-submarine warfare while secondary missions include, but are not limited to, anti-surface ship warfare, mine warfare, and surveillance/reconnaissance. These various missions translate into numerous tactical evolutions such as submerged approach and attack, mine-laying operations, under-ice operations, etc. The conduct of these tactical evolutions requires the utilization of the submarine, with its periscope and electromagnetic sensors, as an integrated weapon system. This system will provide attack center training devices with a simulated sensor package which will include simulated low light level TV and impaired optical data along with scenario correlated Electronic Support Measures intercept data.

(U) RELATED ACTIVITIES: None.

Program Element: 64716N
Title: Submarine Warfare Training Devices
DoD Mission Area: 233 - Antisumbarine Warfare
Budget Activity: 4 Tactical Programs

(U) WORK PERFORMED BY: In-House: Naval Training Equipment Center (NAVTRAEQUIPCEN), Orlando, Florida. Contractor: Submarine Advanced Reactive Tactical Training System, Eclectech Associates, Incorporated, North Stonington, CT. Advanced Visual/Near Visual Electro-Optic Sensor Simulator, to be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0884 (Submarine Advanced Reactive Tactical Training System) continues in the fabrication phase of prototype development. The development contract was awarded in July 1980 This Project and Project X0953 (Advanced Visual/Near Visual Electro-Optic Sensor Simulator) transitioned from Program Element 64703N to Program Element 6 716N during FY 1981. The Functional Baseline and engineering specifications for Project X0953 have been completed. Preparations are being completed for a contract award in FY 1982.

2. (U) FY 1982 Program:

(U) Project No. S0884, SUBMARINE ADVANCED REACTIVE TACTICAL TRAINING SYSTEM: This system will not be completed because of Congressional deletion of funds.

(U) Project No. X0953, ADVANCED VISUAL/NEAR VISUAL ELECTRO-OPTIC SENSOR SIMULATOR: Contract award is scheduled for April 1982. System hardware and software, including the Computer Generated Imagery, will undergo detailed design review during FY 1982.

3. (U) FY 1983 Planned Program:

(U) Project No. X0953, ADVANCED VISUAL/NEAR VISUAL ELECTRO-OPTIC SENSOR SIMULATOR: Prototype procurement contract will be monitored, software development will be completed, CGI system design will be completed.

4. (U) FY 1984 Planned Program:

(U) Project No. X0953, ADVANCED VISUAL/NEAR VISUAL ELECTRO-OPTIC SENSOR SIMULATOR: Complete prototype fabrication, system integration and factory testing. Initial Operational Capability is scheduled in April 1984.

5. (U) Program to Completion:

(U) Project No. X0953, ADVANCED VISUAL/NEAR VISUAL ELECTRO-OPTIC SENSOR SIMULATOR: Final Ready-for-Training date scheduled February 1985.

Program Element: 64716N
DoD Mission Area: 233 - Antisumbarine Warfare

Title: Submarine Warfare Training Devices
Budget Activity: 4 - Tactical Programs

6. (U) Milestones: Not applicable.

7. (U) Resource: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 54717M
Title: Marine Corps Combat Services Support (Engineering)
DoD Mission Area: 215-Land Warfare Support
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	2,010	3,728	3,009	3,812	Continuing	Continuing
C0050	Test Equipment Development	591	411	312	216	Continuing	Continuing
C0079	Combat Logistics Support (Engineering)	800	2,112	1,647	2,203	Continuing	Continuing
C0081	USMC Expeditionary Shelter System	218	295	260	292	Continuing	Continuing
C0083	Marine Corps Controlled Environment Medical System (MCEMS)	315	182	100	114	Continuing	Continuing
C0939	Marine Corps Container System (MCCS)	86	728	690	888	Continuing	Continuing
C1642	Marine Corps Tactical Motor Transport Vehicles (Engineering)	*	*	*	99	Continuing	Continuing

* This is a new FY1984 program. Fiscal Year 1981-1983 Advarced Development efforts are conducted under PE 63729M.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides the engineering development of Marine Corps equipment needed for the supply, maintenance, engineer, motor transport, and service support of operating forces.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To provide better sanitation in the field with improved field head, shower, and laundry units. To provide improved food service equipment. To test and evaluate aerial bridging for heavy and light mechanized assault forces and new floating bridge supports for general support of combat forces. Operational testing of functionally configured Expeditionary Shelter System shelters will be completed. Developmental Test/Initial Operational Test and Evaluation of Medical System functionally appointed shelters will be conducted along with the field evaluation of the Pallet Containers, Quadruple Containers and insert boxes for full range of shipboard/field handling and use. 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 (a decrease of 1724 in FY 1981 and 48 in FY 1982) are the result of reduction of the scope of FY 1981 RDT&E efforts and internal reprogramming to higher priority Marine Corps programs approved by the Congress. FY 1983 decrease of 101 is also due to refinement of estimates of cost including inflation and escalation.

Program Element: 64717M
DoD Mission Area: 215-Land Warfare Support

Title: Marine Corps Combat Services Support (Engineering)
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	1,905	3,234	3,776	3,110	Continuing	Continuing
C0050	Test Equipment Development	198*	592	416	322	Continuing	Continuing
C0079	Combat Logistics Support (Engineering)	882	1,506	2,141	1,704	Continuing	Continuing
C0081	USMC Expeditionary Shelter System	342	218	298	268	Continuing	Continuing
C0083	Marine Corps Controlled Environment Medical System	681	415	184	103	Continuing	Continiung
C0939	Marine Corps Container System	-	503	737	713	Continuing	Continuing

* Non-add, FY 1980 Funds in 63729M, Combat Services Support (Advanced)

(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						
C0076	Combat Logistics Support (Engineering)						
	Sling, Helicopter CH-53	991	583	320	288	473	2,565
	(Quantity)	(407)	(252)	(120)	(100)	(154)	(1,033)
	Reverse Osmosis/Water Distillation	8,023	44,483	16,922	16,426	55,321	141,175
	Unit, 600 Gallons (Quantity)	(51)	(287)	(100)	(90)	(274)	(802)
	Mobile Electric Power	3,949	2,430	-	-	-	6,379
	Distribution System (Quantity)	(32)	(19)	-	-	-	(51)
	Field Shower Unit		759	666	771	2,828	5,024
	(Quantity)		(11)	(90)	(99)	(363)	(563)
	Air Compressor, 250 CFM			4,387	430	NONE	4,817
	(Quantity)			(154)	(14)	NONE	(168)
	Amphibious Assault Fuel System		30,534	9,173	13,600	NONE	53,307
	(Quantity)		(29)	(8)	(11)	NONE	(48)
	Medium Girder Bridge		31,294	30,478	28,042	NONE	89,814
	(Quantity)		(22)	(23)	(20)	(14)	(65)
	Bridge Boats			5,545	-	NONE	5,545
	(Quantity)			(21)	-	NONE	(21)

Program Element: 64717M
DoD Mission Area: 215-Land Warfare Support

Title: Marine Corps Combat Services Support (Engineering)
Budget Area: 4 - Tactical Programs

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	Procurement Marine Corps						
	Fuel, Water Storage and Pump Modules		2,248	2,341	6,191	7,596	18,376
	(Quantity)		-	-	-	-	-
	Container Handler				3,238	3,607	6,989
	(Quantity)				(13)	(13)	(26)
	Floodlight		2,430	924	1,733	2,763	7,850
	(Quantity)		(309)	(100)	(174)	(256)	(839)
	Field Laundry Unit		1,184	489	2,308		3,981
	(Quantity)		(56)	(16)	(70)	-	(142)
	Tactical Airfield Fuel Dispensing System		1,555	3,044	3,647	2,724	10,970
	(Quantity)		(6)	(10)	(11)	(8)	(35)
	Refrigeration System		1,750	1,346	1,395	54	4,545
	(Quantity)		(145)	(100)	(92)	(4)	(341)
C0081	Marine Corps Expeditionary Shelter System Shelter Family	4,267	16,872	19,426	30,351	107,103	178,019
	(Quantity)	(128)	(873)	(659)	(544)	(2,453)	(4,657)
C0050	Test Equipment Development	-	-	-	-	-	-
	Electronic Test Equipment (TELECOM)	-	1,365	4,531	6,011	40,697	52,604
	(Quantity)	-	-	*	*	*	*
	Electronic Test Equipment (NON-TELECOM)	-	1,167	4,086	6,011	40,568	51,832
	(Quantity)	-	-	*	*	*	*
	Test Calibration Maintenance Support (TELECOM)	317	583	840	986	4,722	7,448
	(Quantity)	-	-	*	*	*	*
	Test Calibration Maintenance Support (NON-TELECOM)	-	583	840	986	4,722	7,131
	(Quantity)	-	-	*	*	*	*
	Calibration Facility	-	-	5,635	-	-	5,635
	(Quantity)	-	-	(9)	-	-	(9)
C0939	Container Systems	-	3,262	4,071	4,035	14,026	25,394
	(Quantity) (Mixed)	-	-	-	-	-	-
C1642	Logistics Vehicle System	-	20,000	28,227	24,508	144,802	217,537
	(Quantity)	-	(230)	(344)	(270)	(2,362)	(3,206)

* To be determined

Program Element:64717M
DoD Mission Area: 215-Land Warfare Support

Title: Marine Corps Combat Services Support (Engineering)
Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Test Equipment Development: The activity herein pertains to test, measurement and diagnostic equipment for the maintenance and repair of tactical equipment. Combat Logistics Support (Engineering). This project transitioned in FY 1980 to encompass improved sanitation head, shower and laundry facilities, food service, water systems, electric power, bulk fuel systems in storage/handling/transport; standardization of mobile maintenance shops, protective construction equipment for bunkering of troops, assault bridging, floating bridges, and the Research, Development, Test and Evaluation of these and like items in the Engineering Development stage. USMC Expeditionary Shelter System: This project entails consolidation and standardization of Marine Corps shelters in accordance with DOD INST 4500.37 and provides the Fleet Marine Forces with appropriate shelters to house tactical, logistics and Communications, Command, Control and Computer functions. In ths regard, a family of rigid and knock down shelters is being developed to function both in the field and aboard amphibious shipping. Additionally, larger shelters which will function as semi-permanent warehouses and aircraft maintenance type hangers have transitioned to production development. The shelters developed under this system conform to the parameters of Joint Committee on Tactical Shelters. Marine Corps Controlled Environment Medical System: Using the standard shelters described above, develop a controlled environment mobile operating, pharmacy, laboratory, intensive care, x-ray and dental units capable of functioning as a field hospital. Shelters equipped with standard medical appointments as required furnishings will be used to replace current tent configured units. Marine Corps Container System: Standard field containers in pallet size and larger will be developed to function as transporting modules for unit supplies and for use as expeditionary warehouse components. This hardware is to be interchangeable and linked/locked together in standard containership stowable dimensions.

(U) RELATED ACTIVITIES: Combat Service Support for the 1980's as in Marine Corps concept for a Field Logistics System, Program Elements 63729M, 26624M; Naval Civil Engineering Labs Amphibious Logistics Support Ashore,PE 63719M.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA; Naval Civil Engineering Laboratory, Port Hueneme, CA: Mobility and Equipment Research and Development Command, Fort Belvoir, VA; Marine Corps Logistics Base, Albany. GA. Contractors: Brunswick Corporation, Marion, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Initial Operational Test and Evaluation of Electrical Power Distribution System and water/fuel storage containers and pump modules was completed. Engineering design changes to improve service life and reduce life cycle costs were accomplished. Fleet Marine Force unit allowances for small shelters were established and validated. The Marine Corps Controlled Environment Medical System pharmacy, operating room and laboratory were procured and assembled at Albany, GA, and transported to Camp Lejeune, NC for test and evaluation. Operational testing of Advanced Development Quadruple Containers/Pallet Containers and insert bins was conducted by Fleet Marine Force aviation units. The Navy/Marine amphibious fuel interface problems continued improvement. New refrigeration unit procurement package completed. Test and evaluation of Medium Girder Bridge completed.

Program Element:64717M
DoD Mission Area: 215-Land Warfare Support

Title: Marine Corps Combat Services Support (Engineering)
Budget Area: 4 - Tactical Programs

2. (U) FY 1982 Program: Methods of developing flotation systems for the Medium Girder Bridge in wet gap mode will continue. Operational testing of the field floodlight system will be completed. The design effort for a four hundred cycle Mobile Electric Power Distribution System will begin. New bridge boats will be evaluated. Small shelters will be Approved for Service Use. Assault bridging equipment will be tested and evaluated. New components for handling, storage and distribution of bulk fuel will continue. Development testing of full scale engineering development prototype Quadruple Containers/Pallet Containers and insert bins will begin. Modernization of food services equipment will continue.

3. (U) FY 1983 Planned Program: The configuration of maintenance and supply functions in the standard shelters will continue. The operating room, pharmacy and laboratory of prototype Marine Corps Controlled Environment Medical System modules will complete Operational Testing and Evaluation. Fleet Marine Force allowances for Quadruple Container/Pallet Container will be determined. The Container System will be Approved for Service Use. Testing of multiple use shipping containers as floating pontoons will be completed at the USMC field testing units. Evaluation of assault bridges will continue. Modernization of food services equipment will be completed. New bulk fuel components will be recommended for procurement.

4. (U) FY 1984 Planned Program: The transition of similar hardware from Advanced Development into this Program Element will be conducted as appropriate. The field test of configured shelters will be completed and the test and evaluation of Marine Corps Controlled Environment Medical System will end and be presented for procurement. Quadruple Containers/Pallet Containers will enter production. Other Combat Service Support efforts will continue as necessitated by outyear requirements. Continue T&E of Tactical Motor Transport items in coordination with other services and evaluation commercial items for suitability for Marine Corps application. Field High Mobility Multipurpose Wheeled Vehicle and Logistic Vehicle System (Dragon Wagon). FY 1984 increase of 803 is due to refinement of estimates of cost including inflation and escalation.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64718M
Title: Marine Corps Intelligence/Electronic Warfare Systems (Engineering)
DoD Mission Area: 374 - Multimission Technology and 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	2,615	1,985	2,736	9,237**	Continuing	Continuing
C0060	Forward Pass	1,455	884	-	-	TBD	TBD
C0061	Foliage Penetration Battlefield Surveillance Device (FOLPEN)	598	567	567	*	*	*
C0066	Noncommunication Electronic Countermeasure System	-	**	**	3,713	TBD	TBD
C0068	Expendable Jammers	515	534	454	450	TBD	TBD
C0937	Mobile Electronic Warfare Support System (MEWSS)	-	**	1,665	1,147	TBD	TBD
C1296	All Source Imagery Processor	-	**	**	3,847	TBD	TBD
C1463	Technical Surveillance Countermeasures Equipment (TSCM)	47	-	50	53	TBD	TBD

* Funded in Program Element 26623M, Gound Combat/Supporting Arms Systems
** Funded in Program Element 63730M, Marine Corps Intelligence/Electronic Warfare Systems.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides RDT&E funds for the engineering 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: Foliage Penetration Battlefield Surveillance Device: Begins engineering development. Mobile Electronic Warfare Support System: Begins engineering development. Technical Surveillance Countermeasures Equipment: Will continue the purchase and operational test of selected equipment. Expendable Jammers: Will continue in engineering 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 shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: increases of 543 in FY 9181, decreases of 25 in FY 9182 and 35 in FY 1983 are due to additional projects, cost escalation, and refinements of cost estimates.

Program Element: 64718M
DoD Mission Area: 374 - Multimission Technology and Support

Title: Marine Corps Intelligence/Electronic Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN THE FY 1982 DECRIPTIVE SUMMARY: (Dollars in Thousands)

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Total Additional to Completion	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,885	2,072	2,010	2,771	Continuing	Continuing
C0060	Forward Pass	1,123	1,455	896	*804	Continuing	Continuing
C0061	Battlefield Surveillance Device	363	-	574	579	**	**
C0067	Communications Electronic Countermeasures	50	-	-	-	-	50
C0068	Expendable Jammers	296	617	540	469	Continuing	Continuing
C1463	Technical Surveillance Countermeasures Equipment	53	-	-	-	**	**
C0937	Mobile Electronic Warfare Support System	-	-	-	1,723	Continuing	Continuing

* (Non add) Funded under 26625M, Intelligence/Electronic Warfare Systems
** To be determined

(U) OTHER APPROPRIATION FUNDS: Procurement Marine Corps:

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	Total FY 1983 Estimate	Additional to Completion	Estimated Cost
C0060	Forward Pass	-	-	-	-	20,399	20,399

Program Element: 64718M
DoD Mission Area: 374 - Multimission Technology and Support

Title: Marine Corps Intelligence/Electronic Warfare Systems (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Foliage Penetration Battlefield Surveillance Device: Ground surveillance radar which will detect moving men and vehicles through 300 meters of dense foliage. Expendable Jammers: Small jamming devices capable of being delivered by air, artillery, or hand implantation. Mobile Electronic Warfare Support System: Consists of an armored vehicle configured with electronic countermeasures and electronic warfare support measures equipment. It will provide Marine Corps ground forces with a system capable of conducting electronic warfare support during the amphibious assault and subsequent operations ashore. Technical Surveillance Countermeasures Equipment: Equipment to expand and enhance the capability of Marine Corps counterintelligence teams to detect clandestine surveillance devices emplaced by hostile intelligence organizations.

(U) RELATED ACTIVITIES: Other service developments in electronic warfare, sensor systems, and intelligence systems development.

(U) WORK PERFORMED BY: In-House: Naval Electronics Command, Washington, D.C.; Naval Air Development Center, Warminister, PA; Naval Avionic Center, Indianapolis, IN; Naval Surface Weapons Center, Dahlgren, VA; Harry Diamond Laboratory, Adelphi, MD; Naval Weapons Center, China Lake, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY1981 and Prior Accomplishments: Foliage Penetration Battlefield Surveillance Device: Established a joint advanced development program with the Air Force. Demonstrated the feasibility of a radar detecting moving vehicles and personnel in dense foliage. Expendable Jammers: Commenced joint program of hand emplaced jammers with the U. S. Army. Conducted ballistic hardening and electronic testing of artillery delivered expendable jammers. Commenced negotiations with the U. S. Army on establishing a joint program for artillery delivered expendable jammers. Technical Surveillance Countermeasures Equipment: Tested and evaluated current equipment.

2. (U) FY 1982 Program: Foliage Penetration Battlefield Surveillance Device: Complete advanced development of FOLPEN. Conduct developmental and operational tests. Expendable Jammers: Test hand emplaced expendable jammers. Develop artillery delivered expendable jammers. Mobile Electronic Warfare Support System: Commence advanced development. Technical Surveillance Countermeasures Equipment: Purchase and operationally test selected items of TSCM equipment.

3. (U) FY 1983 Planned Program: Foliage Penetration Battlefield Surveillance Device: Commence engineering development. Develop single antenna system, reduce size of the radar to 30 pounds. Expendable Jammers: Joint Army full scale development of artillery delivered expendable jammers. Mobile Electronic Warfare Support System: Commence engineering development. Technical Surveillance Countermeasures Equipment: Continue operational tests of selected equipment. Determine that equipment which will best support the Marine Corps TSCM mission.

Program Element: 64718M
Title: Marine Corps Intelligence/Electronic Warfare Systems (Engineering)
DoD Mission Area: 374 - Multimission Technology and Support
Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Foliage Penetration Battlefield Surveillance Device: Continue engineering development efforts to reduce the size and weight of the FOLPEN radar. Expendable Jammers: Continue development of air delivered and artillery delivered expendable jammers. Mobile Electronic Warfare Support System: Commence engineering development. Technical Surveillance Countermeasures Equipment: Continue operational tests. Obtain Approval for Service Use and procurement decision for selected equipment.

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

6. (U) Milestones:

	MSI	MSII	MSIII	IOC
Foliage Penetration Battlefield Surveillance Device	FY79	FY82	FY85	FY87
Expendable Jammers	FY78	FY83	FY84	FY85
Mobile Electronic Warfare Support System	-	FY82	FY85	FY86
Technical Surveillance Countermeasures Equipment	-	-	FY84	FY85

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64719M
Title: Marine Corps Command/Control/Communications Systems (Engineering)
DoD Mission Area: 344 - Tactical Command and Control
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	62,291	48,573	27,888	25,699	TBD	TBD
C0022	Tactical Warfare Simulation, Evaluation and Analysis System	1,189	927	1,003	1,185	TBD	TBD
C0036	Marine Integrated Fire and Air Support System	18,416	15,291	9,340	3,456	TBD	TBD
C0037	Tactical Combat Operations System	801	9,220	14,206	18,258	TBD	TBD
C0038	Tactical Air Operations Central - 1985	41,090	20,284	*	*	*	*
C0042	Position Location Reporting System	781	2,525	2,982	1,975	TBD	TBD
C0052	Navigation-System Using Time and Ranging Global Positioning System	14	166	223	228	TBD	TBD
C0053	Joint Tactical Information Distribution System	(5**)	160	134	597	TBD	TBD

* Funded in 64720M, Tactical Air Operations Central - 1985 in FY 1983 and subsequent years.
** Funded in 26313M, Marine Corps Telecommunications in FY 1981 and prior years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides funds for the engineering development of Marine Corps Command, Control and Communications systems. Most of the projects are Marine Tactical Command and Control Systems improvements. This concept envisions an air/ground tactical command and control systems integration to the maximum extent possible and oriented toward the amphibious environment to meet the unique requirements of Landing Force Commanders. The projects are aimed toward more effective command and control of Tactical Forces during both amphibious operations and land operations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funds for all projects within this Program Element are applied to developing systems that will meet the specific requirements necessary for total integration and inter/intraoperability within the entire tactical command and control spectrum. Tatical Warfare Simulation Evaluation and Analysis System: Continue development of the Integrated Map Controller package and continue expansion of data base for new scenarios. Marine Integrated Fire and Air Support System: Continue fabrication of the engineering development model. Tactical Combat Operations: Continue design evaluation for an Engineering Development Model.

Program Element:64719M Title: Marine Corps Command/Control/Communications Systems (Engineering)
DoD Mission Area: 344 - Tactical Command and Control Budget Area: 4 - Tactical Programs

Position Location Reporting System: Continue with production. The Marine Corps will continue to monitor Navigation System Using Time and Ranging Global Positioning System user equipment development and conduct studies for unique service requirements. Navigation System Using Time and Ranging Global Positioning System: Provide service requirements. Joint Tactical Information Distribution System: Provide continuing support to ensure that Marine Corps requirements are incorporated into the system. 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 FY 1982 Descriptive summary and that shown in this Descriptive Summary are due to: Marine Integrated fire and Air Support System: The FY 81 increase of 4823 is due to software cost growth experienced during the Engineering Development Model efforts. These high risk software developments are to be completed during FY 1982 thereby minimizing the risk of future cost growths. Tactical Combat Operations System: The FY 1981 decrease of 2576 was due to continued support for the hardware associated with the Marine Integrated Fire and Air Support System. This hardware will be utilized by the Tactical Combat Operations System. Position Location Reporting System: The FY 1981 decrease of 308 was due to a delay until FY 1982 in operational testing of the Full Scale Engineering Development Model. Navigation System Using Time and Ranging Global Positioning System: The FY 1981 decrease of 113 was due to a redefinition of the requirement for a course deviation indicator in the Landing Vehicle Tracked 7A1 development program. All other changes result from program restructures to refine cost estimates including escalation.

Program Element: 64719M
Title: Marine Corps Command/Control/Communications Systems (Engineering)
DoD Mission Area: 344 - Tactical Command and Control
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	28,015	54,462	46,526	TBD	TBD	TBD
C0022	Tactical Warfare Simulation, Evaluation and Analysis System	792	1,181	927	TBD	TBD	TBD
C0026	AN/TPQ-36 Fire Finder	165	-	-	TBD	TBD	TBD
C0036	Marine Integrated Fire and Air Support System	14,482	13,593	15,309	TBD	TBD	TBD
C0037	Tactical Combat Operations System	1,687	3,377	9,231	TBD	TBD	TBD
C0038	Tactical Air Operations Central-1985	8,281	35,095	18,207	TBD	TBD	TBD
C0041	Lightweight, Three-Dimensional, Ground Control Intercept Radar (AN/TPS-59)	162	-	-	TBD	TBD	TBD
C0042	Position Location Reporting System	2,435	1,089	2,526	TBD	TBD	TBD
C0052	Navigation System Using Time and Ranging Global Positioning System	11	127	168	TBD	TBD	TBD
C0053	Joint Tactical Information Distribution System	*	*	160	TBD	TBD	TBD

* Funding in 26313M, Marine Corps Telecommunications to support the Marine Corps portion of this program.

Program Element:64719M
DoD Mission Area: 344 - Tactical Command and Control

Title: Marine Corps Command/Control/Communications Systems (Engineering)
Budget Area: 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
	Procurement, Marine Corps (Dollars in Thousands)						
C0022	Tactcial Warfare Simulation, Evaluation and Analysis System (Fleet Marine Hardware Upgrade)	-	200	290	290	TBD	TBD
C0026	AN/TPQ-36 FIREFINDER Radar Set AN/TPQ-36 (Quantity)	-	-	TBD	TBD	TBD TBD	TBD
C0036	Marine Integrated Fire and Air Support System (Quantity)	-	-	TBD	TBD	TBD TBD	TBD
C0037	Tactical Combat Operations (TCO) (Quantity)	-	-	TBD	TBD	TBD TBD	TBD
C0042	Position Location Reporting System (Quantity)	- -	- -	44,246 (2)	50,032 (2)	TBD 155,071 (6)	253,349

Program Element:64719M Title: Marine Corps Command/Control/Communications Systems (Engineering)
DoD Mission Area: 344 - Tactical Command and Control Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Tactical Warfare Simulation, Evaluation and Analysis System: This system will provide real-time combat situations for unit solutions and evaluation of gaming results. An/TPQ-36 Fire Finder: This system will provide the capability to locate hostile weapons (artillery, mortars, rockets) with sufficient accuracy to permit their destruction by counterfire. Marine Integrated Fire and Air Support System: A system of procedures, personnel and equipment used to coordinate and control air support, naval gunfire, artillery and mortar assets employed in support of maneuver element of an amphibious task force. Tactical Combat Operations: A system that will assist Marine Commanders and their staff as they execute the command and control functions of amphibious operations. It will provide information that has been processed by selective automation and will enhance the effectiveness in which combat operations are conducted by efficiently depicting the current enemy and friendly situation and integrating information from other command and control systems. Position Location Reporting System: This project will develop an electronics system which will provide accurate, rapidly updated friendly position information to all key elements of a landing force. Navigation System Using Time and Ranging Global Positioning System: This is a DOD directed, (Joint Service with U.S. Air Force as executive agency) project that will develop a space-based radio navigation system which when combined with accurately positioned ground stations will provide users with precise 3-dimensional position, location, velocity and reference time throughout the globe. Navigation System Using Time and Ranging Global Positioning System manpacks will be bought in limited quantity to help anchor Position Location Reporting System and provide position location information to users outside the division's tactical area of responsibility. Joint Tactical Information Distribution System: This project will develop secure, jam resistant, digital information exchange of communications, navigation, and identification data.

(U) RELATED ACTIVITIES: This program relates to all tactical command and control 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; Tactical Information Processing and Interpretation - Program Office, L.G. Hanscom field, Boston, MA; U.S. Army Electronic Command, Fort Monmouth, NJ; Naval Weapons Center, China Lake, CA; U.S. Air Force Space and Missile Organization, Los Angeles, CA; Joint Tactical Information Distribution System Program Office, Air Force Electronic System Division, Boston, MA; and Naval Ocean System Center, San Diego, CA. Contractors: Norden Systems, Norwalk, CT; and Hughes Aircraft Company, Fullerton, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Tactical Warfare Simulation, Evaluations and Analysis System: equipment for the Fleet Marine Force has been delivered and integrated software to include force level simulations has been accepted. AN/TPQ-36: Production contract has been awarded. Marine Integrated Fire and Air Support System: Entered into a contract for an Engineering Development Model. Tactical Combat Operations: Requirement document has been published and test bed work commenced. Position Location Reporting System: Engineering development Model contract has been awarded. Navigat on System Using Time and Ranging Global Positioning System: Predesign effort has been completed. Joint Tactical Information Distribution System: Defined the Marine Corps requirements and concept of employment.

Program Element:64719M
DoD Mission Area: 344 - Tactical Command and Control

Title: Marine Corps Command/Control/Communications Systems (Engineering)
Budget Area: 4 - Tactical Programs

2. (U) FY 1982 Program: Tactical Warfare Simulation, Analyses and Evaluation and Analysis System: Project will design, produce and test the Integrated Maneuver Controller applications software, and expand the data base for new scenarios. Project will design integrated software, to include force level simulations. Marine Integrated Fire and Air Support System: Project will continue design evaluation for an Engineering Development Model. Position Location Reporting System: Will complete operational testing and enter the production phase. Navigation System Using Time and Ranging Global Positioning system: Will Continue in engineering development. Joint Tactical Information Distribution System: Monitor and participate in the development and testing for this system.

3. (U) FY 1983 Planned Program: Tactical Warfare Simulation, Evaluation and Analysis System: expand the data base for new scenarios using digitized terrain techniques and design/implement results of the interoperability analysis. Marine Integrated Fire and Air Support System: Project will continue Engineering Development Model fabrication. Tactical Combat Operations: Project will continue design evaluation for an Engineering Development Model. Position Location Reporting System: Procurement will continue. Navigation System Using Time and Ranging Global Positioning System: Project will conduct unique Marine Corps testing. TPS-59 first article will be delivered to the U.S. Marine Corps testing. A further production decision will then be made by the Marine Special Acquisition Review Counsel. Joint Tactical Information Distribution System: Continues development with Marine Corps participation.

4. (U) FY 1984 Planned Program: Tactical Warfare Simulation, Evaluation and Analysis: Continued software development of the three fielded systems. Marine Integrated Fire and Air Support System: Commence developmental and operational testing. Tactical Combat Operations: Commence full scale development by contracting for an Engineering Development Model. Position Location Reporting System: Contractor will continue development to fielding in November. Navigation System Using Time and Ranging Global Positioning System: Defense Special Acquisition Review Council III is scheduled for May 1984 with the production phase to follow. Joint Tactical Information Distribution System: Continue development and testing.

5. (U) Program to Completion: Tactical Warfare Simulation, Evaluation, and Analysis System: Research and Development will end in FY 1985. Efforts until that time wll be directed towards software refinement of the three fielded systems. Marine Integrated Fire and Air Support System, Tactical Combat Operations, Position Location Reporting System, Navigation System Using Time and Ranging Global Positioning System, and Joint Tactical Information Distribution System: Continue with production phase to fielding in late 1986.

6. (U) Milestones: Not applicable.

Project: C0036 Title: Marine Integrated Fire and Air Support System
Program Element: 64719M Title: Marine Corps Command/Control/Communications Systems (Engineering)
DoD Mission Area: 344 - Tactical Command and Control Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Marine Integrated Fire and Air Support System is a tactical data system with which the commander can control and coordinate air, naval gunfire, artillery, and mortar assets to achieve more effective and responsive fire support for ground maneuver elements. The Marine Integrated Fire and Air Support System through organic tactical data equipments will provide real-time information and computations for application of timely and accurate fire support missions.

(U) RELATED ACTIVITIES: Ths project relates to all tactical command and control systems.

(U) WORK PERFORMED BY: In-House: Marine Corps Development and Education Command, Quantico, VA; Marine Corps Tactical System Support Activity, Marine Corps Base, Camp Pendleton, CA; Naval Electronics System Support Activity, Marine Corps Base, Camp Pendleton, CA; Naval Electronics Systems Command, Washington, DC; Naval Ocean System Command, San Diego, CA. Contractor: Norden Systems, Norwalk, CT.

(U) PROGRAM ACCOMPLISHMENTS AND [illegible] URE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Test bed efforts completed and Request for Proposals were issued. Based on response to the Request for Proposals, contracts were let to commence the contract definition phase. The results of this was evaluated and a contract was let to commence fabrication of an Engineering Development Model (EDM) in September 1979. FY 1980 was the first full year of Engineering Development Model fabrication.

2. (U) FY 1982 Program: Continue Engineering Development Model fabrication. Commence hardware developmental testing II.

3. U) FY 1983 Planned Program: Complete fabrication of the Engineering Development Model. Continue hardware developmental testing II. Commence software developmental testing II.

4. (U) FY 1984 Planned Program: Complete developmental testing II. Commence operational testing II.

5. (U) Program to Completion: Complete operational testing II. Enter into a procurement contract for the equivalent of four Marine Amphibious Force (MAF) size systems, one for each Marine Amphibious Forces of the regular establishment of the Marine Corps.

Project: C0036
Program Element: 64719M
DoD Mission Area: 344 - Tactical Command and Control

Title: Marine Integrated Fire and Air Support System
Title: Marine Corps Command/Control/Communications Systems (Engineering)
Budget Area: 4 - Tactical Programs

6. (U) Milestones:

	Milestone	Date
1.	Commence Engineering Development Model Fabrication	FY 1979
2.	Conduct Testing	FY 1982
3.	Marine Corps System Acquisition Review Council	FY 1985
4.	Initial Operational Capability	FY 1987

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
C0036	Marine Integrated Fire and Air Support System	18,416	15,291	9,340	3,456	TBD	TBD

Project: CC037 Title: Tactical Combat Operations System
Program Element: 64719M Title: Marine Corps Command/Control/Communications Systems (Engineering)
DoD Mission Area: 344 - Tactical Command and Control Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This is a system that will assist Marine Commanders and their staff as they execute the command and control functions of amphibious operations. It will provide information that has been processed by selected automation and will enhance the effectiveness in which combat operations are conducted. Commanders at all levels will have near real time information immediately to facilitate the integration of the scheme of maneuver with support arm employment.

(U) RELATED ACTIVITIES: This program relates to all tactical command and control systems.

(U) WORK PERFORMED BY: In-House: Marine Corps Tactical System Support Activity, Marine Corps Base, Camp Pendleton, CA; Naval Electronics Systems Command, Washington DC; Marine Corps Development and Education Command, Quantico, VA Contractors: Potomac General Research Group, Washington, DC; Calculon Inc., Washington, DC; Norden Industries, Norwalk, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Tactical Combat Operations Systems: Requirements document has been published and test bed work commenced. Preliminary Systems Description Document approved. The Development Proposal has been updated and revised. A Tactical Combat Operations Costing of Effective Alternatives (COEA) was commenced with a due date of Aug 1981. The Tactical Combat Operations Engineering Study was completed by Norden.

2. (U) FY 1982 Program: Tactical Combat Operations System: Continue to develop a Tactical Combat Operations Engineering Development Model Design.

3. (U) FY 1983 Planned Program: Tactical Combat Operations System: Continue design evaluation for an Engineering Development Model.

4. (U) FY 1984 Planned Program: Tactical Combat Operations System: Conduct Milestone II reviews in the Marine Corps and submit Request for Proposal.

5. (U) Program to Completion: Tactical Combat Operations System: Complete fabrication of the Engineering Development Model, Conduct Developmental Test/Operational Test II, Complete Milestone III decision.

6. (U) Milestones:

	Date
1. Marine Corps Special Acquisition Review Council, Milestone II	November 1983
2. Engineering Development Model Contract	January 1984
3. Development Test	1985
4. Initial Operational Capability	1989

Project: C0037
Program Element: 64719M
DoD Mission Area: 344 - Tactical Command and Control

Title: Tactical Combat Operations System
Title: Marine Corps Command/Control/Communications Systems (Engineering)
Budget Area: 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
C0037	Tactical Combat Operations System	801	9,220	14,206	18,258	TBD	TBD

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64720M
Title: Tactical Air Operations Central - 1985
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	41,090*	20,284*	12,736	4,468	TBD	TBD
C0038	Tactical Air Operations Central - 1985	41,090	20,284	12,736	4,468	TBD	TBD

* FY 1981 and 1982 funding in PE 64719M, Marine Corps Command/Control/Communications Systems (Engineering)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This new Program Element provides funds for the engineering development of Marine Corps Command, Control and Communications Systems. Specifically, this project provides an improvement to the Marine Air Command and Control System.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To continue Engineering Development Model fabrication. 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 refinement of the program primarily as a result of entering into an Engineering Development Model contract. FY 1981 increase of 5995 results from the fact that both the government and contractor had underestimated the scope of the effort for that year. All changes including the increase of 2077 in FY 1982 and 12736 in FY 1983 have been due to an effort to structure the program so that cost estimates are refined to include all 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	8,281*	35,095*	18,207*	TBD	TBD	TBD
C0038	Tactical Air Operations Central - 1985	8,281	35,095	18,207	TBD	TBD	TBD

* The FY 1982 and prior funding was appropriated under PE 64719M, Marine Corps Command/Control/Communications Systems (Engineering).

Program Element: 64720M

Title: Tactical Air Operations Central - 1985

DoD Mission Area: 344-Tactical Command and Control

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
PMC	-	-		85,600	192,300	277,900
Quantity				(3)	(9)	(12)

(U) DETAILED BACKGROUND AND DESCRIPTION: A requirement exists to gain and maintain air superiority, interdict the battle area and provide air support to the landing force. Automation aids have already proven effective in accomplishing the command and control functions associated with tactical air operations, permitti anti-air warfare and air support operations to be executed in a more efficient, timely and judicious manner. The curr ctical Air Operations Central was fielded in 1966 and by 1985 will be worn out in service, logistically unsupportable and not capable of meeting the postulated threat. The Tactical Air Operations Central - 1985 will be more effective because it will provide more effective integration with the other systems of the Marine Tactical Command/Central System. The proposed system will be a combination of equipment installed in a shelter constituting an operations module. By combining these operations modules, an air defense center can be readily configured for specific operational situations, especially to the amphibious environment.

(U) RELATED ACTIVITIES: This project is related to all other Tactical Command and Control System projects.

(U) WORK PERFORMED BY: In-House: HQMC, Washington, D.C.; Marine Corps Development and Education Command, Quantico, VA; Marine Corps Tactical System Support Activity, Marine Corps Base, Camp Pendleton, CA; Naval Electronics System Command, Washington, D.C.; Naval Ocean Systems Command, San Diego, CA. Contractor: Litton Data Systems, Van Nuys, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Required Operational Capability and a System Description Document have been published. Specifications were drafted and request for proposals issued. Two contractors were chosen and the project entered into the contract definition phase. Upon completion of this phase one contractor was chosen and Engineering Development Model fabrication commenced.

2. (U) FY 1982 Program: Continue Engineering Development Model fabrication and development testing.

3. (U) FY 1983 Planned Program: Complete Engineering Development Model fabrication and commence testing; deliver Engineering Development Model to government; operationally evaluate the Tactical Air Operations Central-1985 Engineering Development Model; prepare for and conduct Marine Systems Acquisition Review Council III.

Program Element: 64720M Title: Tactical Air Operations Central - 1985

DoD Mission Area: 344-Tactical Command and Control Budget Activity: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Tactical Air Operations Central-1985 Production Contract.

5. (U) Program to Completion: Conduct operational and developmental testing. After obtaining Approval for Service Use, enter into a procurement contract.

6. (U) Milestones:

Milestone	Date
1. Marine Corps System Acquisition Review Council II	FY 1979
2. Start Developmental Testing	FY 1982
3. Start Operational Testing	FY 1983
4. Marine Corps System Acquisition Review Council III	FY 1983
5. Initial Operational Capability	FY 1986 (Nov 85)

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64761N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Intelligence (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	5,189	6,069	13,092	9,099	Continuing	Continuing
R0246	Anti-Compromise Emergency Destruct (ACED)	834	1,103	1,070	1,086	Continuing	Continuing
T0772	Foreign Material Exploitation	2,090	2,201	2,768	2,463	Continuing	Continuing
X0809	Electro-Optical Sensor Development	2,245	2,271	3,285	3,086	Continuing	Continuing
T1459	Foreign Material Acquisition	0	494	455	448	Continuing	Continuing
T1668	LINK MANGO	(2,346)*	(7,965)*	5,514	2,016	Continuing	Continuing

*Funded in another Program Element in FY 1982 and prior. Details available at a higher classification.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The expansion of the Soviet fleet has placed an increased burden on the Navy to assess the threat. The resources of this program element are focused on the development of unique collection devices. Also included in this Program Element is the development of a family of systems to deny unauthorized acquisition of vital U.S. information and equipment under emergency or no-notice conditions.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project R0246, Anti-Compromise Emergency Destruct, will develop, test and begin production of anticompromise emergency destruct systems to satisfy requirements identified within the Navy, Defense Intelligence Agency, and National Security Agency (e.g., a portable incendiary document system, a pyrotechnic system for installation in security filing cabinets and an electronic system based upon deflagrating printed circuit board technology and/or non-damaging electronic erasure technology as it relates to thin-film and solid state electronic components and systems). Project T0772, Foreign Material Exploitation, will continue several efforts initiated in FY 1981 and FY 1982.

Project X0809, Electro-Optical Sensor Development, will continue development of sensors as well as initiate new efforts, commensurate with the state-of-the-art, to provide electro-optical system for scientific and technical data collection. Project T1459 Foreign Material Acquisition provides funding for procurement of certain materials as they become

available on a case basis. Project T1668, LINK MANGO, is a classified project, the details of which are available separately. 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 due to minor downward adjustments caused by revised inflation indices (-43 in FY 1981 and -82 in FY 1982). In FY 1983 a budget reduction of 534 and the transfer of LINK MANGO was transferred to this program element (+5,514) results in a net increase of 4,980.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,044	5,232	6,151	8,112	Continuing	Continuing
R0246	Anti-Compromise Emergency Destruct (ACED)	0	840	1,117	1,177	Continuing	Continuing
T0772	Foreign Material Exploitation	1,600	2,107	2,232	3,047	Continuing	Continuing
X0869	Electro-Optical Sensor Development	2,944	2,285	2,302	3,388	Continuing	Continuing
T1459	Foreign Material Acquisition	500	0	500	500	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 64761N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Intelligence (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: A requirement exists to collect specific data to enable adequate naval assessment of the threat posed by electro-optical, antiship cruise missile and other weapon system capability in a rapidly expanding Soviet Fleet. The resources of this program element are focused on the development of unique collection devices[illegible] in order to facilitate the timely development of countermeasures equipment, doctrine, and tactics. At present, five efforts are underway: R0246, Anti-Compromise Emergency Destruct: Develop systems to deny unauthorized acquisition of vital U.S. information and equipment under emergency no-notice conditions. Primary use of developed systems in Navy will be aboard non-combatant ships engaged in sensitive missions and at selected shore facilities located in militarily and/or politically sensitive areas. Navy is assigned Defense-wide responsibility for all anti-compromise emergency destruct research and engineering for anticompromise emergency destruct systems. T0772, Foreign Material Exploitation Program: Provides the Navy with hard scientific and technical data on foreign hardware, technical manuals, and technology.

[illegible], X0809, Electro-Optical Sensor Development: [illegible]

Acquisition: acquire material for exploitation in support of project T0772. T1688 LINK MANGO: T1459 Foreign Material details available at a higher classification.

(U) RELATED ACTIVITIES: Army and Air Force developments are continuously monitored for techniques and technology which are applicable to Foreign Material Exploitation and Shipboard/Airborne Electro-Optical Intelligence Collection sensor development. Program Element 63522N Advanced Submarine Surveillance Equipment Program, Program Element 64792N Surface Electromagnetic/Optical Systems (advanced) are on-going related Advanced and Engineering Development programs. Program Element 31022F Air Force Scientific and Technical Intelligence, Program Element 64255N Air Electronics Warfare and Program Element 64709A Evaluation of Foreign Components are ongoing efforts related to Foreign Material Exploitation.

(U) WORK PERFORMED BY: In-House: Naval Electronic Systems Command, Washington, DC; Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA.; Naval Ordnance Station, Indian Head, MD. Contractors: Texas Instruments, Ridgecrest, CA; Martin-Marietta, Orlando, FL; Applied Physics Laboratory/Johns Hopkins University, Laurel, MD; Ford Aerospace, Newport Beach, CA; Solid Photography, Inc., Melville, NY.; Hi-Shear Corp., Torrance, CA; Martin Electronics, Inc., Orlando, FL; Unidynamics/Phoenix, Phoenix, AZ.

Program Element: 64761N
DoD Mission Area: 323 ~ TIARA for Naval Warfare

Title: Intelligence (Engineering)
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENT AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: R0246 Anticompromise Emergency Destruct: Documentation stemming from a previous effort was categorized and indexed, testing to support production and development of a portable system was completed, and testing to support full scale development of a security filing cabinet system as well as a magnetic tape destruct system was initiated. Requirements within the Defense Department were fully identified. T0772 Foreign Material Exploitation:

X0809 Electro-Optical Sensor Development: Several electro-optical collection systems and special application cameras have been developed and successfully deployed under this project.

To support the requirement

etc.

T1459 Foreign Material Acquisition: acquired foreign materials to develop techniques and specifications in support of countermeasures and detection equipment development. 11688 LINK MANGO: details available at a higher classification.

2. (U) FY 1982 Program: R0246 Anti-Compromise Emergency Destruct: (a) Complete testing to verify improvements/corrections in portable document system, begin developmental testing related to production and deployment of security filing cabinet system and magnetic tape system, and begin full scale development for an electronic system. T0772 Foreign Material Exploitation: (a) Continue exploitation of technical manuals and equipments; (b)

(c) Testing

will be completed. T1459 Foreign Material Acquisition:

T1668

LINK MANGO: Details available at a higher classification.

Program Element: 54761N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: Intelligence (Engineering)
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 Planned Program: R0246, Anti-Compromise Emergency Destruct: Testing to verify improvements/corrections for security filing cabinet and magnetic tape systems. Developmental testing for electronic systems. T0772, Foreign Material Exploitation: (a) X0809, Electro-Optical Sensor Development: (a) Flight verification and testing Systems will be completed. Development of a system will be initiated. T1459, Foreign Material Acquisition: Develop new acquisition sources programs. T1668 LINK MANGO: Details available at a higher classification.

4. (U) FY 1984 Planned Program: R0246, Anti-Compromise Emergency Destruct: Begin production of a portable document system and a security filing cabinet system. Complete testing to verify improvements/corrections for magnetic tape system and developmental testing for electronic system. Begin testing to verify improvements/corrections for electronic system. T0772, Foreign Material Exploitation: (a) (b) (c) Continue development of specialized portable exploitation equipment; (d) X0809 Electro-Optical Sensor Development: Relocation of sensors as a result of major aircraft upgrade modifications. Development of capability for temporary installation on surface ships. T1459, Foreign Material Acquisition: Acquisition of foreign devices and manuals will continue. T1668 LINK MANGO: Details available at a higher classification.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64771N
Title: Medical Development (Engineering)
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	1,329	2,047	2,314	2,464	Continuing	Continuing
M0933	Medical/Dental Equipment (Development)	1,329	2,047	2,314	2,464	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: An important element of the Navy Medical Department's mission is the development and improvement of medical/dental equipment which will ensure rapid and effective health care delivery in any operational theater. The unique demands of combat operations and other military engagements place stringent performance requirements upon the support systems and equipment necessary to maintain total combat readiness. This Program Element involves the development of medical and dental equipment designed for durability and reliability in field and shipboard use and compatibility with other Navy and Marine Corps equipment, and which will significantly enhance casualty treatment and care capability. The program includes the engineering development of several new items as they transition from earlier stages of the developmental cycle and the modification of off-the-shelf medical equipment to withstand the rigors and compatibility requirements of field/shipboard use. This development effort is directly related to the unique environmental aspects of Navy and Marine Corps operations and is closely coordinated with the efforts of the other services to avoid duplication. These developments are not available from the civil sector.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Funds are required to support the engineering development of (1) a Remote Medical Diagnosis System to transmit and receive essential emergency medical information between ships and shore-based diagnostic centers, (2) a mobile compact microprocessor-controlled group audiometer for hearing surveillance and early diagnosis of hearing loss, (3) equipment for diagnosing at the squadron level faulty balance-sense function in aviators, (4) a mobile field dental operatory which will be compatible with the current family of Marine Corps medical shelters and provide dental service support at the Fleet Marine Force Company level, (5) a modular shipboard/field clinical laboratory which will increase capabilities to diagnose and treat individuals injured while engaged in fleet operations, (6) a portable dental treatment unit which will support field operations at the Battalion Aid Station level, (7) an occupational health information monitoring system, (8) improved sonar headphones, (9) an aviation biomedical monitoring system, and (10) a performance assessment battery for use in stressful operational environments. The proposed work involves the development of improved design criteria and specifications and the fabrication and operational test and evaluation of engineering development models. 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.

Program Element: 64771N
DoD Mission Area: 235 - Naval Warfare Support

Title: Medical Development (Engineering)
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: decreases of 99, 128 and 51 for FY 1981, FY 1982 and FY 1983, respectively are attributable to internal reprogramming to Exploratory Development and Navy adjustments during budget development.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	995	1,428	2,175	2,365	Continuing	Continuing
M0933	Medical/Dental Equipment (Development)	995	1,428	2,175	2,365	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 64771N
DoD Mission Area: 235 - Naval Warfare Support

Title: Medical Development (Engineering)
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Maintaining the combat readiness of naval personnel during periods of peacetime and mobilization is a primary mission of the Navy Medical Department. This Program Element supports the development of new medical/dental equipment in order to provide improved medical and dental systems for health maintenance and casualty care. Such systems must be useful in all geographic regions of the world and must function under a myriad of operational and combat conditions. Since medical equipment built for the civilian health care market is not sufficiently reliable and rugged for shipboard and military field use without modification, commercially available equipment must be "hardened" to meet operational specifications, modified to be compatible with shipboard and field generator electronics, and packaged as a complete and functional system. The element consists of one project, M0933 (Medical/Dental Equipment Development) under which several pieces of equipment are being developed. The program is dynamic and its scope is dependent on the number of items ready for transition from Advanced Development to Engineering Development. These developments are directly related to the unique environmental aspects of Navy and Marine Corps operations and are closely coordinated with the efforts of the other services to avoid duplication.

(U) RELATED ACTIVITIES: Related Army medical equipment development is conducted by the U. S. Army Medical Bioengineering R&D Laboratory, Ft. Detrick, MD. The program is coordinated under an interdepartmental memorandum of understanding. Development of the aviation biomedical monitoring system is closely coordinated with the Air Force.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Health Research Center, San Diego, CA; Naval Aerospace Medical Research Laboratory, Pensacola, FL; Naval Dental Research Institute, Great Lakes, IL. Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Completed specifications for the engineering development model of the Marine Corps Expeditionary Dental Shelter designed to provide combat dental support to the Fleet Marine Force. Fabricated four engineering development models of the Portable Life Support Stretcher Unit and tested advanced development models at the Fleet Hospital T&E deployment at the Marine Corps Mountain Warfare Center. Developed and released a solicitation to fabricate four engineering development models of the Remote Medical Diagnosis System, a system to transmit and receive essential emergency medical information between ships and shore-based diagnostic centers. Fabricated engineering development model of the Medical Back Pack designed to increase the ability of medical personnel to safely transport sophisticated equipment and supplies to shipboard accident sites. Developed two prototype models of the self-generated head motion component of the oculo-vestibular testing system for detecting balance-sense dysfunction in aviation personnel. Completed design specifications for a microprocessor-controlled group audiometer for support of the Navy Hearing Conservation Program. Completed specifications for a prototype Navy Occupational Health Information System.

Program Element: 64771N
Title: Medical Development (Engineering)
DoD Mission Area: 235 - Naval Warfare Support
Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: Develop Test Plan, Training Plan and Integrated Logistics Support Plan for the engineering development model of the Remote Medical Diagnosis System. Test the operational suitability of the Portable Life Support Stretcher Unit and obtain approval for service use. Commence technical and operational test and evaluation of the Marine Corps Expeditionary Dental Shelter in the field. Perform technical evaluation of the oculo-vestibular testing system. Test and evaluate prototype microprocessor-controlled group audiometer and Navy Occupational Health Information System. Conduct test and evaluation of "off-the-shelf" audiometric, acoustic, and hearing protection devices. Begin development of a biomedical monitoring system for use in assessing the physiological status of aviators during extreme flight conditions (i.e. aircraft testing and air combat maneuvering training).

3. (U) FY 1983 Planned Program: Acceptance of first engineering development model of the Remote Medical Diagnosis System for technical and operational test and evaluation. Complete operational test and evaluation of the mobile dental operatory. Fabricate engineering development prototypes of modular shipboard/field clinical laboratory to increase laboratory diagnostic capabilities. Fabricate engineering design model of the oculo-vestibular testing system. Complete test and evaluation of microprocessor-controlled group audiometer. Continue operational test and evaluation of prototype Occupational Health Information System and assessment of audiometric, acoustic and hearing protective devices. Fabricate prototype of aviation biomedical monitoring system. Begin development of improved sonar headphones and performance assessment battery for use in stressful environments.

4. (U) FY 1984 Planned Program: Conduct laboratory and environmental testing and shipboard installation of the Remote Medical Diagnosis System engineering development models. Fabricate test model of blood component thawing device to increase component recovery and substantially minimize the problem of microbial contamination. Commence engineering development of a laser-based surgical device to repair severed blood vessels and nerves in the field. Fabricate a blood component shipping container which will maintain a 1-10 degree C temperature range under ambient temperature extremes. Complete operational and technical evaluation of engineering design model of the oculo-vestibular testing system. Complete operational test and evaluation of the Navy Occupational Health Information System. Complete technical evaluation of the aviation biomedical monitoring system prototype. Fabricate prototypes for improved sonar headphones and performance assessment battery. Commence engineering developme t of a chemical warfare casualty prediction model to aid Navy and Marine Corps medical and logistics planners.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64779N
Title: Joint Interoperability of Tactical Command and Control Systems
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	8,245	5,505	6,395	11,518	Continuing	Continuing
X1080	Joint Interoperability of Tactical Command and Control Systems (JINTACCS)	8,245	5,505	6,395	11,518	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for the development and test of bit and character oriented message standards for use in joint tactical information exchange. Included is the development of bit oriented messages for the Joint Tactical Information Distribution System (Tactical Digital Information Link J) (Link 16); configuration management testing of bit oriented messages used by tactical systems in the Tactical Air Control Systems/Tactical Air Defense Systems interface (Tactical Digital Information Links A and B), and the development and test of character oriented message standards for joint tactical operations in five functional segments: Intelligence, Air Operations, Operations Control, Fire Support and Amphibious.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Bit oriented messages: Continue development of Tactical Digital Information Link J (Link 16) message standards; continue configuration management testing of message standards for Tactical Digital Information Links A and B. Character oriented messages: Continue configuration management testing of Intelligence message standards. Conduct Air Operations Operational Effectiveness Demonstration. Complete operations control compatibility and interoperability testing. Commence Fire Support and Amphibious segment compatibility and interoperability testing. Commence planning for combined character oriented message segments Operational Effectiveness Demonstration. Commence planning for character oriented message standards implementation. Complete joint maritime reporting standard requirement. As this is a continuing program the above 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 that shown in this Descriptive Summary are -1,085 in FY 1981 due to reprogramming action, -176 in FY 1982 and +141 in FY 1983 as a result of funding constraints and refined estimates for escalation.

Program Element: 64779N
DoD Mission Area: 344 - Tactical Command and Control

Title: Joint Interoperability of Tactical Command and Control Systems
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENTS	6,183	9,330	5,681	6,254	Continuing	Continuing
S1080	Joint Interoperability of Tactical Command and Control Systems (JINTACCS)	6,183	9,330	5,681	6,254	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 64779N
Title: Joint Interoperability of Tactical Command and Control Systems
DoD Mission Area: 344 - Tactical Command and Control
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Interoperability of Tactical Command and Control Systems program is an Office of the Secretary of Defense and Joint Chiefs of Staff directed effort with the Army as Executive Agent. The purpose of the program is to develop interface standards, implement the standards in tactical command and control systems, conduct tests to insure technical compatibility and interoperability, and demonstrate operational effectiveness. Standards for character oriented messages are documented in a jointly developed Technical Interface Design Plan with the following major sections: Air Operations, Operations Control, Amphibious, Fire Support and Intelligence. Message standards for the Joint Tactical Information Distribution Systems data link, Tactical Digital Information Link J (Link 16), are also being developed under this program. On 1 October 1980, the Joint Interoperability of Tactical Command and Control Systems program assumed responsibilities for configuration management testing of Tactical Digital Information Links A and B.

(U) RELATED ACTIVITIES: U.S. Army, U.S. Marine Corps, and U.S. Air Force automated tactical command and control systems developments in accordance with the Joint Interoperability of Tactical Command and Control Systems interface standards in order to achieve joint compatibility and interoperability. Development of the Joint Tactical Information Distribution System. Configuration Management of the Tactical Air Control Systems/Tactical Air Defense Systems interface (Tactical Digital Information Links A and B).

(U) WORK PERFORMED BY: In-House: Naval Electronics Systems Command, Washington, DC; Naval Electronic Systems Engineering Activity Detachment, Philadelphia, PA; Fleet Combat Direction Systems Support Activity, San Diego, CA; Naval Ocean Systems Center, San Diego, CA; and others. Contractors: PRC, Inc., Philadelphia, PA; and others.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Bit oriented messages: Continued development of test edition of message standards for Tactical Digital Information Link J (Link 16). Commenced configuration management of Tactical Digital Information Links A and B. Character oriented messages: Completed development of proposed message standards for testing for the Intelligence, Air Operations, Operations Control, Amphibious and Fire Support segments. Established Navy Intelligence Participating test unit and conducted intelligence compatibility and interoperability testing. Conducted Intelligence segment Operational Effectiveness Demonstration. Commenced Intelligence segment configuration management testing. Established participating test unit for Air Operations, Operations Control, Amphibious and Fire Support segments. Prepared for Air Operations segment compatibility and interoperability testing.

2. (U) FY 1982 Program: Bit oriented messages: Complete test edition of standard for Tactical Digital Information Link J (Link 16). Prepare for Tactical Digital Information Link J compatibility and interoperability testing. Continue Tactical Digital Information Links A and B configuration management testing. Character oriented messages: Continue Intelligence segment configuration management testing. Conduct Air Operations segment compatibility and interoperability testing. Complete preparations for

Operations Control segment compatibility and interoperability testing. Prepare for Amphibious and Fire Support segments compatibility and interoperability testing. Prepare for Air Operations segment Operational Effectiveness Demonstration.

3. (U) FY 1983 Planned Program: Bit oriented messages: Continue preparations for Tactical Digital Information Link J (Link 16) compatibility and interoperability testing. Continue Tactical Digital Information Links A and B configuration management testing. Complete Operations Control segment compatibility and interoperability testing. Commence Amphibious and Fire Support segment compatibility and interoperability testing. Conduct Air Operations segment Operational Effectiveness Demonstration. Commence planning for combined character oriented message segments Operational Effectiveness Demonstration. Commence planning for character oriented message standards implementation.

4. (U) FY 1984 Planned Program: Bit oriented messages: Continue preparations for Tactical Digital Information Link J (Link 16) compatibility and interoperability testing. Continue Tactical Digital Information Links A and B configuration management testing. Character oriented messages: Complete Amphibious and Fire Support segments compatibility and interoperability testing. Continue planning for combined character oriented segments Operational Effectiveness Demonstration. Continue planning for character oriented message standards implementation.

5. (U) Program to Completion: Complete compatibility and interoperability testing and conduct Operational Effectiveness Demonstrations for all message standards. Commence/continue configuration management testing for all message standards. This is a continuing program.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64780M
Title: Joint Interoperability of Tactical Command and Control Systems
DoD Mission Area: 344 - Tactical Command and Control Systems
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	1,030	1,249	1,699	7,620	Continuing	Continuing
C1079	Joint Interoperability of Tactical Command and Control Systems (JINTACCS)	1,030	1,249	1,699	7,620	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element supports the Joint Chiefs of Staff sponsored Joint Interoperability of Tactical Command and Control Systems program which provides for development of joint message standards and procedures to insure interoperability between Marine Corps data systems and other Services/Agency systems.

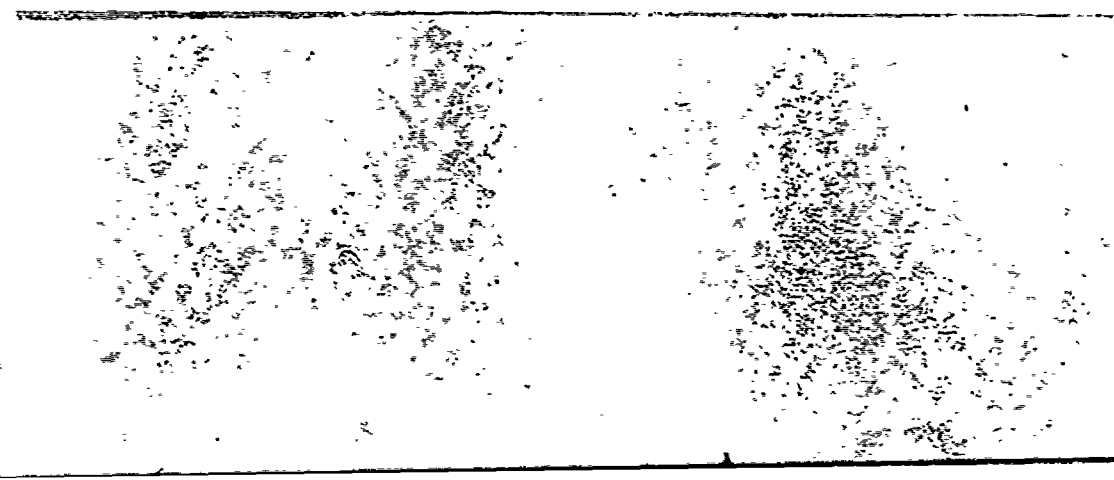
(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue testing testbed support and participate in joint analyses in suppprt of the Joint Chiefs of Staff sponsored program. As this is a continuing program the above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated through FY 1984 only.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands). The changes (-25 in 1981 and -16 in FY 1982) between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are due to refined estimates of costs. The increase of 290 in FY 1983 estimate is due to the incorporation of the Joint Interoperability Tactical Air Command and Control Systems (JINTACCS) standards into the Marine Air Ground Intelligence System.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	908	1,055	1,265	1,409	Continuing	Continuing
C1079	Joint Interoperability of Tactical Command and Control Systems	908	1,055	1,265	1,409	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.



Program Element:64780M
DoD Mission Area: 344 - Tactical Command and Control Systems

Title: Joint Interoperability of Tactical Command and Control Systems
Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program was established to ensure that achievement of compatibility and interoperability of tactical command and control systems used in joint military operations. Further, it will insure the development and testing of joint message standards for the Joint Tactical Information Distribution System. In accomplishing these tasks, U.S./NATO interoperability requirements will be considered to the maximum extent practicable.

(U) RELATED ACTIVITIES: This program relates to all tactical command and control 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. Contractors: TBD

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program (formerly Ground and Amphibious Military Operations) has completed the Intelligence, Air Operations, Fire Support, Amphibious Operations and Operations Control Technical Interface Design Plans. Joint Interoperability of Tactical Command and Control Systems is developing message standards for the Joint Tactical Information Distribution System. Marine Air Ground Intelligence System retrofit to Joint Interoperability of Tactical Command Control Systems Standards commenced. Compatibility and interoperability testing of the Intelligence segment was completed, and the Joint Interoperability of Tactical Command and Control Systems Intelligence messages were utilized by the Commander in Chief Atlantic during the Solid Shield-1981 Operational Effectiveness Demonstration (OED).

2. (U) FY 1982 Program: Commence Compatibility and Interoperability Testing of Air Operations Standards. Commence Configuration Management testing of Intelligence Standards. Provide for test bed support of testing and participation in joint analysis. Commence the transition of the Tactical Air Control System/Tactical Air Deployment System (TACS/TADS) interface configuration management testing responsibilities.

3. (U) FY 1983 Planned Program: Continue compatibility and interoperability testing for Air Operations in preparation for Air Operations Operational Effectiveness Demonstration in FY 1983. Commence compatibility and interoperability testing for Operations Control. Continue configuration management testing for Intelligence. Commence configuration management testing responsibility for the Tactical Air Command System/Tactical Air Defense System interface. Incorporate JINTACCS standards into the Marine Air Ground Intelligence System.

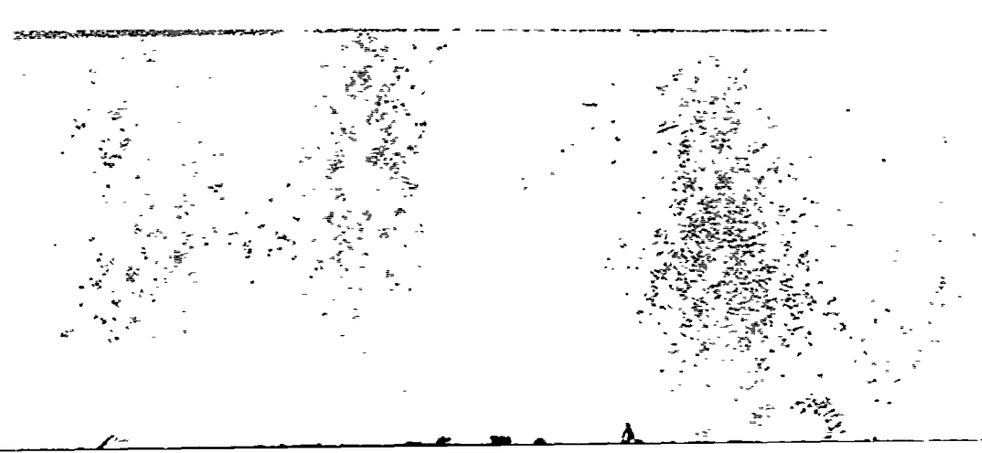
Program Element: 64780M
DoD Mission Area: 344 - Tactical Command and Control Systems

Title: Joint Interoperability of Tactical Command and Control Systems
Budget Area: 4 - Tactical Programs

4. (U) FY 1984 Planned Program: Commence configuration management testing for Air Operations standards, and continue testing of Intelligence standards. Continue compatibility and interoperabilty testing of Operations Control standards; commence testing of Fire Support and Amphibious Operations standards. Prepare for Operational Effectiveness Demonstration in FY 1985. Continue configuration management testing responsibility for the TACS/TADS interface.

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

6. (U) Milestones: Not applicable.



FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation
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	17,070	17,257	18,316	22,962	Continuing	Continuing
R0130	Intra-Type Tactical Development and Evaluation	8,484	8,285	8,795	11,098	Continuing	Continuing
R0131	Methods for Analysis of Fleet Tactical Effectiveness and Evaluation	2,729	2,767	2,801	3,497	Continuing	Continuing
R0151	Inter-Type Tactical Development Evaluation	5,857	6,205	6,720	8,367	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides commanders in the fleet with technical and analytic support to develop and evaluate tactics during fleet operations, exercises, and operational experiments in order to achieve maximum combat readiness of operational forces and systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To support the Fleet Commanders in developing optimum inter-type Battle Group tactics and procedures for the effective and efficient employment of current forces and equipment and to provide support to the Fleet Force Commanders (air, surface, submarine) for Intra-type Tactical Development and Evaluation Project at the level needed to develop, in a timely manner, tactics and procedures for the optimum tactical employment of both existing and new platforms and equipment. 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 (-232 in FY 1981, -2,182 in FY 1982, and -3,379 in FY 1983) result from a Navy application of a Congressionally imposed reduction for inflation in FY 1981, and a general reduction of level of effort in FY 1982 and FY 1983.

Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	19,682	17,302	19,439	21,695	Continuing	Continuing
R0130	Intra-Type Tactical Development and Evaluation	7,989	8,536	9,423	10,700	Continuing	Continuing
R0131	Methods for Analysis of Fleet Tactical Effectiveness and Evaluation	2,769	2,854	3,111	3,510	Continuing	Continuing
R0151	Inter-Type Tactical Development Evaluation	4,924	5,912	6,905	7,485	Continuing	Continuing
T1038	Acoustic Analysis Support	4,000	0	0	0	0	*

* Continued in Program Element 65853N, Management and Technical Support in FY 1981 and subsequent years.

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: In 1973 the Chief of Naval Operations established the Tactical Development and Evaluation program to permit the Fleet Commanders to pursue an integrated, comprehensive and coordinated effort for the development of inter-type tactics. This project provides support to Fleet Commanders in developing and evaluating tactics for battle groups, task forces, and forces of mixed platform types. In FY 1977, the intra-type project was initiated to provide support to Fleet Type Commanders of submarine, surface and air forces for the development of tactics and procedures peculiar to their various individual platforms and equipment. The Methods for Analysis of Fleet Tactical Effectiveness and Performance project complements inter- and intra-type Tactical Development and Evaluation by funding the development of analysis and evaluation methods and associate means for identification of tactical deficiencies.

(U) RELATED ACTIVITIES: The Fleet Tactical Development and Evaluation support program, Program Element 63711N, develops standardized procedures and equipments (manual, semi-automatic, and automatic) for collection of exercise and operational data, develops systems for reconstruction of those events and provides a central library of tactical development information.

(U) WORK PERFORMED BY: In-House: Commanders in the fleet, having established development requirements, will plan the actions necessary to investigate tactical problems, formulate solutions, evaluate them, and disseminate the results. Fleet commands receive technical and analytical support from Navy Laboratories including Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, Newport, RI: Naval Surface Weapons Center, Silver Spring, Md; Naval Ocean Systems Center, San Diego, CA; and Naval Weapons Center, China Lake, CA. Contractor: Center for Naval Analyses (Operations Evaluation Group), Arlington, VA; Pacific Analysis Corp., Honolulu, HI; Walter V. Sterling, Inc., San Diego, CA; Analysis and Technology, Inc , North Stonington, CT; Atlantic Analysis Corp., Norfolk, VA; Planning Systems, Inc., McLean, VA; Daniel H. Wagner Associates, Inc., Paoli, PA; Mantech Systems, Rockville, MD; Operations Research, Inc., Silver Spring, MD; Stanford Research Institute, Menlo Park, CA; Planning Research Corp., Los Angeles, CA; and Ketron, Inc., Arlington, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In 1973 a coordinated Tactical Development and Evaluation program at the operational fleet commander level was established to address effective methods of tactical employment of mixed platform task forces and groups. This effort pulled together existing platform tactics and provided improved task force/group tactical employment doctrine. In 1975, the improvement of existing tactical employment concepts and development of new tactics for existing weapons systems was initiated. In 1976, the initial steps were taken to develop improved and new tactics for existing weapons systems at the platform level. This effort was successful and a coordinated Tactical Development and Evaluation program for both mixed platform task forces/groups and individual platforms was implemented. Since 1977, continued emphasis has been directed toward coordination and integration of forces. As a result of the program approximately 425 effective tactical documents are in existence which are constantly screened for doctrine for inclusion into Naval Warfare Publications. Drawing on accumulated

tactical data, Commanders in the fleet recently planned, reconstructed and analyzed fleet exercises with emphases on: (1) coordination and integration of multiple platform/escort activities, (2) command and control, and communications among air, surface and subsurface platforms, (3) Improved methods for coordination of Electronic Warfare capabilities, and (4) coordination and integration of newly introduced Long-Range Weapons systems. Investigations of various other tactical concepts and procedures both at the platform and task force level were also conducted. The net result is that the fleet can employ its combat systems, platforms and forces more effectively, can respond readily to changes in the enemy threat and can effectively employ new systems as they are deployed.

2. (U) FY 1982 Program: Fleet exercises and experiments will be designed, performed, and analyzed to continuously assess the tactical capability of our forces. New tactical concepts will be developed, evaluated, and tested. Systems tactical performance and effectiveness analyses will continue in support of air, surface and submarine platforms systems and subsystems. Tactical development implementation plans for FY 1982 include areas of investigation such as: Tactical Threat Assessment and Simulation, Carrier Task Force Employment Tactics, Continuation of Over-the-Horizon Tactical Development for all platform types, integration of Mediterranean Area and Task Force ASW tactical procedures, submarine operations for Coordinated Multi-Platform Tactics, P-3 aircraft targeting procedures for HARPOON employment, Electronic Warfare System Tactics and Rapid Blooming Offboard Chaff Employment. Selected Anti-Air Warfare and minefield planning tactics and performance analyses will be conducted. The methods for Analysis of Fleet Tactical Effectiveness Project complements fleet commanders' tactical development and evaluation projects by activities encompassing both exploratory work on projects to be later developed under that program, and by exploiting tactical improvement opportunities not otherwise covered. Activities include readiness and operational performance evaluation to identify tactical improvement needs, analysis of threat tactics to support fleet operations, development of analytic methodology techniques to support tactical analysis and test projects, quick-reaction analysis support for Fleet operations, development and preliminary analysis and evaluation of innovative tactics, and planning and evaluation support for tactical Development and Evaluation.

3.) FY 1983 and FY 1984 Planned Programs: Fleet and Type Commanders will continue those tactical development projects initiated in FY 1982 requiring further effort to achieve project goals and will plan and execute new projects of tactical significance requiring further investigation. Technical and analytical support will be provided to the Fleet Commanders to assist in the design, reconstruction and analysis of Fleet exercises to support development and evaluation objectives of the various tactical projects. Areas to be investigated in FY 1983 and FY 1984 depend directly on tactical deficiencies identified through FY 1982 and entered in the Tactical Development and Evaluation Master Plan.

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

5. (U) Milestones: Not applicable.

Project: R0130
Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Intra-Type Tactical Development and Evaluation
Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project was initiated in FY 1977 to encompass major tactical and fleet operational analysis and systems performance/effectiveness evaluation in Tactical Development and Evaluation for Surface, Submarine and Air Platforms and their installed equipment. These analyses and evaluations will be instrumental in the development of fleet tactics to improve our combat readiness relative to a rapidly expanding and increasingly capable threat. The work in this project will be specifically oriented to the development and introduction of new or improved tactics addressing the peculiarities of individual platform types in order to increase their operational effectiveness. The development and evaluation of tactics will be accomplished principally through the design, conduct, reconstruction, analysis, documentation and reporting of fleet exercises and operational events under the direction of the Fleet and Type Commanders. Specific tasks associated with each tactical development requirement will be carried out primarily at the operational staff and unit level including commands such as Submarine and Surface Warfare Development Groups, Patrol Wings Atlantic and Pacific, and Commander Mine Warfare Command.

(U) RELATED ACTIVITIES: The Fleet Tactical Development and Evaluation Support Program, Program Element 63711N develops standardized methods and equipments (manual, semi-automatic and automatic) for collection of exercise and operational data, develops methods and systems for reconstruction of those events and provides a central library of tactical development information. In addition, results and initiatives undertaken in the intra-type program are coordinated with and frequently act as a basis for efforts in the inter-type program.

(U) WORK PERFORMED BY: In-House: Commanders in the Fleet, having established tactical development requirements, will plan the actions necessary to investigate tactical problems, formulate solutions, evaluate them, and disseminate the results. Fleet commands receive technical and analytical support from Navy Laboratories including Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, Silver Spring, MD; Naval Ocean Systems Center, San Diego, CA; and Naval Weapons Center, China Lake, CA. Contractor: Center for Naval Analyses (Operations Evaluation Group), Washington, D.C.; Pacific Analysis Corporation, Honolulu, HI; Ketron Incorporated, Arlington, VA; Atlantic Analysis Corporation, Norfolk, VA; Planning Systems Incorporated, McLean, VA; Daniel H. Wagner Associates, Incorporated, Paoli, PA; Mantech Systems, Rockville, MD; Operations Research Incorporated, Silver Spring, MD; Stanford Research Institute, Menlo Park, CA; Planning Research Corporation, Los Angeles, CA; DELEX, Inc., Vienna, VA; SONALYST, Inc., Waterford, CT; Browing and Eagle, Ledyard, CT; and Summet, Inc., Gaithersburg, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Submarine, Surface and Air Type Commanders established fleet projects which were approved by the Commander in Chief of the U.S. Atlantic and Pacific Fleets and coordinated with the Fleet's inter-type Tactical Development and Evaluation projects. Project operations consisted of planning, reconstruction and analysis of at-sea exercises directed at the identification, investigation and resolution of tactical problems. The new tactical doctrines developed in this

Project: R0130 Title: Intra-Type Tactical Development and Evaluation
Program Element: 65155N Title: Fleet Tactical Development and Evaluation
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

program for the specific platforms are being used as the building blocks upon which the integrated platform tactics will be developed in the Inter-type program. A sampling of the types of tactical problems investigated included: (a) LAMPS Over-the-Horizon Detection, Classification and Targeting, (b) Air Anti-Diesel Submarine Tactics, (c) Surface Combatant Active/Passive Anti-Submarine Warfare Tactics. (d) Clandestine Advance Force Operations (e) Fighter/Aircraft Electronic Warfare Aircraft and Maritime Air Superiority Tactics, (f) Submarine Tactical Employment of Evasion Devices, (g) Submarine TOMAHAWK Long-Range Missile Tactical Employment, (h) Surface-Launched HARPOON Tactics Evaluation, (i) Coordinated Air Offensive Mining, and (j) Utilization of ASW Aircraft in Surface Over-the-Horizon Targeting Missions.

2. (U) FY 1982 Program: Submarine, Surface and Air Type Commanders have formulated fleet projects approved by the Commander in Chief of the U.S. Atlantic and Pacific Fleets and coordinated with the Fleet's Inter-type Tactical Development and Evaluation projects. Program objective is to achieve maximum effectiveness in fleet use of in-service weapons systems. The new tactical doctrine developed in this program for the specific platforms will continue to be used as the building blocks upon which the integrated platform tactics will be developed in the Inter-type Tactical Development and Evaluation program. High priority tactical deficiencies planned for investigation include: (a) Surface Combatant Active/Passive Anti-Submarine Warfare Tactics (continuing), (b) A-7E Weapons System Tactical Employment Improvement, (c) Improved HARPOON Tactics, (d) Develop Operating Procedures and Tactics Peculiar to the Directional Command Activated Sonobuoy System, (e) Surface Combatant Over-the-Horizon Targeting (continuing), (f) Carrier Air Wing Integrated Tactical Development (continuing), (g) Improve Submarine Long-Range ASW Search and Localization Tactics, (h) Air Anti-Diesel Submarine Tactics (continuing), (i) Fighter/Aircraft and Electronic Warfare Aircraft Electronic Warfare Tactics (continuing), (j) Surface Combatant Anti-Ship Missile Electronic Warfare Defense (continuing).

3. (U) FY 1983 and FY 1984 Programs: Surface, Submarine and Air Type Commanders will establish Fleet Tactical Development and Evaluation Projects for review and approval by the Commander in Chiefs of the U.S. Atlantic and Pacific Fleets. Project operations will consist of planning, reconstruction and analysis of at-sea exercises to support identification of tactical deficiencies, assessment of tactical performance and evaluation of proposed tactics aimed at updating existing or developing new tactical doctrine to counter-emerging threat systems which have improved capability. Major new systems will be included prior to operational test and evaluation phases per OPNAVINST 3960.10A (series) and others with the operational test and evaluation documentation. Areas requiring tactical development in FY 1983 and FY 1984 are determined by tactical deficiencies identified through FY 1982 and which are included in the Tactical Development and Evaluation Master Plan.

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

5. (U) Milestones: Not applicable.

Project: R0130
Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Intra-Type Tactical Development and Evaluation
Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

6. (U) Resources:

Project No.	Title	FY 198' Actua'	FY 198: Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0130	Intra-Type Tactical Development	8,484	8,285	8,795	11,098	Continuing	Continuing

Project: R0151
Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Inter-Type Tactical Development Evaluation
Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project involves tactical and fleet tactical performance/effectiveness evaluation in order to support the development and evaluation of new or improved tactics for the employment of mixed platform types in an integrated force. The analysis, evaluation and technical support provided to the fleet under this program are critical to the development of tactical procedures which will promote maximum combat readiness against an increasingly sophisticated threat. The work in this project is specifically directed at the development and introduction of new or improved tactics for use by integrated forces, i.e., Battle Groups or forces, which consist of multi-platform types. Tactics developed under the intra-type program for specific platform types frequently serve as the building blocks for the tactical considerations for the coordinated employment of mixed factors. Inter-type tactical development is essential for continued investigation and resolution of the complexities involved in exploiting the diverse capabilities of the different platform and systems in order to achieve a cohesive, tactically integrated force with maximum combat effectiveness and readiness.

(U) RELATED ACTIVITIES: The Fleet Tactical Development and Evaluation Support Program, Program Element 63711N develops standardized methods and equipments (manual, semi-automatic) for collection of exercise and operational data, develops methods and systems for reconstruction of those events to allow in depth analysis of events and provides a central library of tactical development information for use in evaluating Navy-wide tactics and procedures. In addition, results and initiatives undertaken in the intra-type program are coordinated with and frequently act as a basis for efforts in the inter-type program.

(U) WORK PERFORMED BY: In-House: Commanders in the fleet having established Tactical development requirements, will plan the actions necessary to investigate tactical problems, formulate solutions, evaluate them, and disseminate the results. Fleet commands receive technical and analytical support from Navy Laboratories including Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, Silver Spring, MD; Naval Ocean Systems Center, San Diego, CA; and Naval Weapons Center, China Lake, CA. Contractor: Center for Naval Analyses and Ketron Incorporated, Arlington, VA; Atlantic Analysis Corporation, Norfolk, VA; Planning Systems Incorporated, McLean, VA; Daniel H. Wagner Associates Incorporated, Paoli, PA; Mantech Systems, Rockville, MD; Sonalysts Incorporated, Waterford, CT; Stanford Research Institute, Menlo Park, CA; Planning Research Corporation, Los Angeles, CA; and PRESEARCH, Inc., Arlington, VA. The development and evaluation of tactics is accomplished principally through the design, conduct, reconstruction, analysis, documentation and reporting of fleet exercises and operational events under the direction of the Fleet Commanders-in-Chief and numbered Fleet Commanders. Specific tasks associated with each tactical development effort are carried out primarily at the numbered fleet and Battle Group staff level such as Commander Second Fleet, Commander Sixth Fleet and Commander Task Force Sixty.

Project: R0151
Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

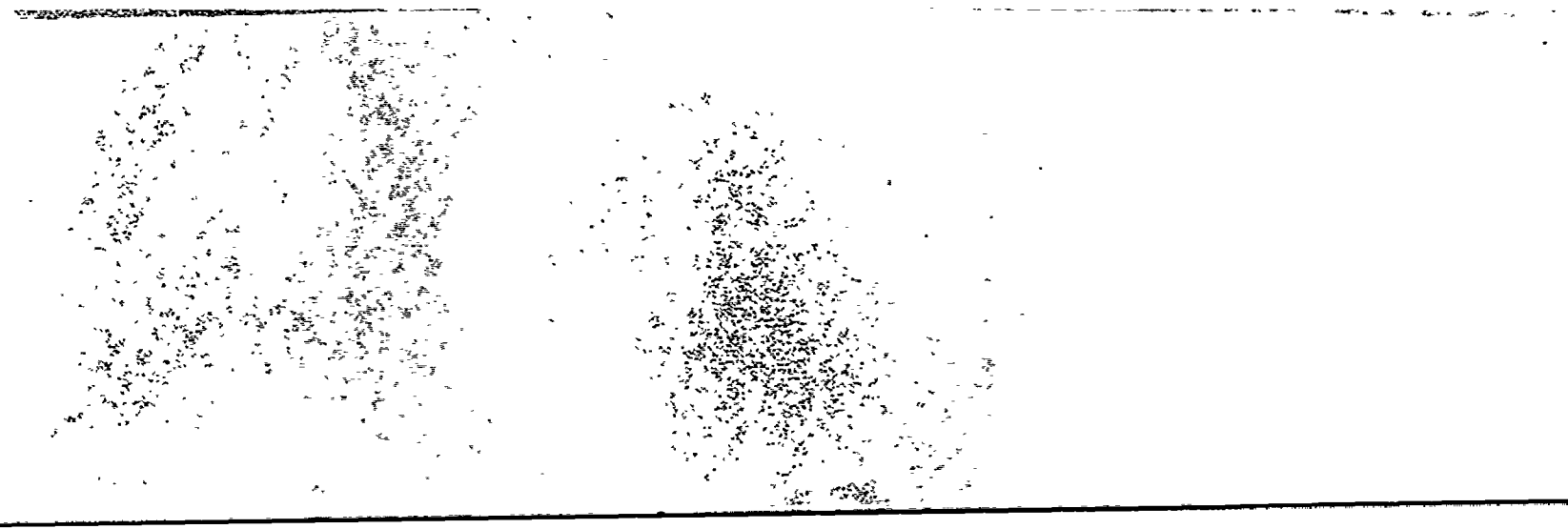
Title: Inter-Type Tactical Development Evaluation
Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The numbered Fleet Commanders have established fleet projects approved by the Commanders in Chief of the U.S. Atlantic and Pacific Fleets. Individual project operations consisted of planning, reconstructuring and analyzing at-sea exercises in order to identify, quantify and resolve tactical problems associated with battle force combat. New and improved tactical doctrine has been continuously developed, evaluated and promulgated which has increased the tactical readiness of integrated fleet forces. Areas which have received previous emphasis resulting in an improved tactical posture include for example: Over-the-Horizon Targeting against Surface Long-Range Weapons Threat, Battle Group Electronic Warfare Coordination, Coordinated Task Force Passive Sensor Denial and Deception Operations, Employment of Air Assets in Coordinated Operations, Tactical Application of Surveillance assets against the Air Threat; Improved Tactics for Utilization of Nuclear Attack Submarines in Coordinated Battle Group Operations.

2. (U) FY 1982 Program: The numbered Fleet Commanders have identified tactical areas requiring investigation and have structured projects to address these areas which have been approved by the Commanders in Chief of the U.S. Atlantic and Pacific Fleets. Program objective is to achieve maximum combat effectiveness of fleet in service platforms and systems through optimization of their tactical employment. Areas scheduled for tactical problem resolution include: Development of integrated positioning and mission tasking options for battle group surface, sub-surface and air ASW platforms; identification of tactical criteria for selection of active; passive or active/passive search plan alternatives for attack Submarine (SSN) battle group support; development of tactical options for establishment of optimum Carrier Battle Group defense in a multi-threat environment; enhancement of tactical utilization of Ocean Surveillance systems and forces in support of battle group operations; development of procedures for Electronic Courtermeasures/Weapons System tactical integration in order to optimize battle group defense; development of tactical procedures for enhancement of amphibious Ready Group defense; development of tactical communications requirements for command and control of anti-ship cruise missile capable platforms; development of tactical planning and execution options for battle group prosecution of diesel submarines; development of multi-unit tactics to optimize sensor employment in choke point anti-submarine warfare.

3. (U) FY 1983 and 1984 Planned Programs: Numbered Fleet Commanders will formulate fleet Tactical Development & Evaluation projects for review and approval by the Commanders in Chief of the U.S. Atlantic and Pacific Fleets. Project operations will consist of definition of warfare activities exhibiting tactical deficiencies or having potential for effectiveness through utilization of new or improved tactical procedures. Project support will be directed at providing the fleet with assistance in planning, reconstruction and analysis of at sea exercises and operational events in order to identify the specifics of tactical deficiencies, assess tactical performance and evaluate proposed tactics in order to update existing or create new tactical doctrine to deal with emerging threat systems of greater density and increased capability. Specific projects are determined by tactical deficiencies identified through FY 1982 and included in the Tactical Development and Evaluation Master Plan.



Project: R0151
Program Element: 65155N
DoD Mission Area: 235 - Naval Warfare Support

Title: Inter-Type Tactical Development Evaluation
Title: Fleet Tactical Development and Evaluation
Budget Activity: 4 - Tactical Programs

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0151	Inter-Type Tactical Development	5,857	6,205	6,720	8,367	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65853N
DoD Mission Area: 235 - Naval Warfare Support

Title: Management and Technical 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	12,335	12,546	11,685	13,862	Continuing	Continuing
S0231	ASW System Support	4,201	4,774	5,376	5,489	Continuing	Continuing
R0905	Sea Control Tactical and Operational Analysis	2,929	2,136	1,582	1,750	Continuing	Continuing
T1038	Acoustic/Non-Acoustic Analysis Support	5,214	5,586	4,727	6,632	Continuing	Continuing
R1562	Warfare Planning Support	0	50	*	*		

*Funded in PE 65873 after FY 1982.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides centralized management control to the Director, Naval Warfare (OP-095) through the use of contractor and other government activities, engineering, technical, analytical and management support. It provides ASW Systems engineering systems analysis support to the Chief of Naval Material (PM-4) and, under the direction of the Naval Intelligence Support Center it provides analyses of acoustic/non-acoustic data on submarine characteristics to determine parameters that may be exploited by revised tactics or new ASW systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST. Provide the comprehensive management, analysis, direction, coordination and integration necessary to ensure a properly structured Naval Warfare program. Continue analysis of submarine characteristics. 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 consist of the following: S0231: 242 decrease in FY 1981, and 326 decrease in FY 1982 are due to minor cost savings. The 1,940 decrease in FY 1983 is due to a reduction in program scope. R0905: 889 increase in FY 1981 is due to a major reorganization and increased scope of the Director, Naval Warfare (OP-095) and the decrease of 29 in FY 1982 is due to minor cost savings. The decrease of 1,940 in FY 1983 is due to the transfer to the O&MN appropriations. T1038: 980 decrease in FY 1981 is due to reduced near term analysis requirements. The 82 decrease in FY 1982 represents minor repricing. The 1,696 decrease in FY 1983 reflects rephasing of planned outyear analyses.

Program Element: 65853N
DoD Mission Area: 235 - Naval Warfare Support

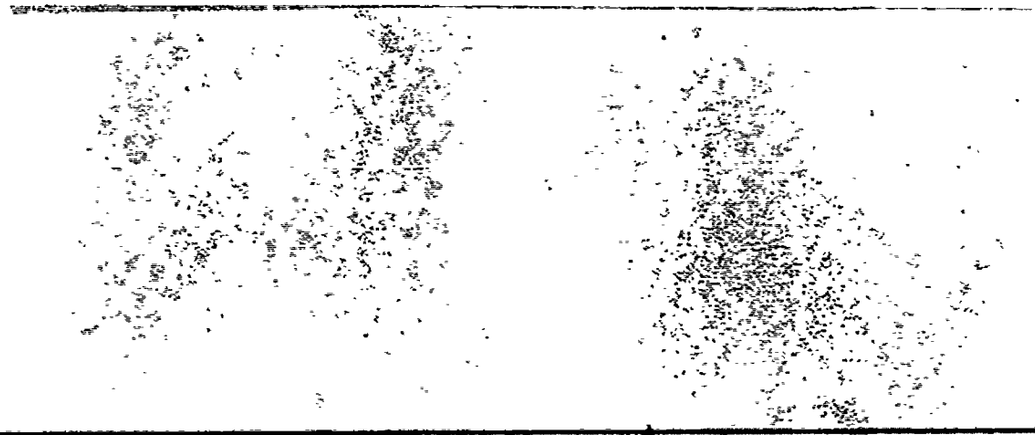
Title: Management and Technical Support
Budget Activity: 4 - Tactical Programs

(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	5,376	12,677	12,983	17,238	Continuing	Continuing
S0231	ASW System Support	3,670	4,443	5,160	7,316	Continuing	Continuing
R0905	Sea Control Tactical and Operational Analysis	1,706	2,040	2,165	3,499	Continuing	Continuing
T1038	Acoustic/Non-Acoustic Analysis Support	*	6,194	5,668	6,423	Continuing	Continuing
R1562	Warfare Planning Support	0	0	50	0		

*Funded in Program Element 65155N, Fleet Tactical Development and Evaluation.

(U) OTHER APPROPRIATION FUNDS: None.



Program Element: 65853N
DoD Mission Area: 235 - Naval Warfare Support

Title: Management and Technical Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The need for centralized management and control of anti-submarine warfare programs was recognized with establishment of the ASW Systems Project Office (PM-4) in the Naval Material Command in 1964. The ASW Systems Support Project provides the comprehensive direction, coordination and integration necessary to ensure that fully supported equipment is developed and produced by several Systems Commands within the Naval Material Command to satisfy approved ASW operational requirements in a timely manner. It includes specific studies and analyses to form the basis for developmental decision-making for the ASW program, and the Sea Control Tactical/Operational Analysis project (R0905), previously limited to ASW analyses only, has now been expanded to encompass all of Naval tactical warfare. Project R0905 focuses on implementation of a warfare "task area" approach in the conduct of Naval tactical warfare. These task areas, encompassing ASW, Anti-air warfare, Anti-surface warfare, strike warfare, mine warfare, amphibious warfare and special warfare, have been aggregated under the organizational cognizance of the Directorate for Naval Warfare (OP-095). Project R0905 develops management tools and techniques for achieving warfare task area coordination, balance, scope, direction of on-going actions, plus quick reaction technical analyses to determine feasibility/viability of new concepts in tactical warfare. Acoustic/Non-Acoustic Analysis (Project T1038) provides analysis of submarine characteristics to determine parameters that may be exploited by new ASW systems, or revised tactics.

(U) RELATED ACTIVITIES: All Naval tactical warfare efforts.

(U) WORK PERFORMED BY: In-House: Naval Coastal Systems Center, Panama City, FL; Naval Research Laboratory, Washington, DC.; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Surface Weapons Center, Dahlgren, VA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Air Development Center, Warminster, PA; Navy Postgraduate School, Monterey, CA; Office of Naval Research, Arlington, VA; Naval Ocean Systems Center, San Diego, CA; Chief of Naval Education and Training, Pensacola, FL; Naval Ocean Research and Development Activity, Bay St. Louis, MS; U.S. Naval Academy, Annapolis, MD; Naval Intelligence Support Center, Suitland, MD. Contractors: TRW Inc., McLean, VA; Presearch Inc., Arlington, VA; Automation Industries, Inc., (Vitro Laboratories) Silver Spring, MD; *Planning Research Corporation, Los Angeles, CA.; Systems Planning Corporation, Arlington, VA.; *MATRIX Corporation, Vienna, VA; MAR, Inc., Rockville, MD; Applied Management Techniques, Inc., Arlington, VA; *Defense Systems, Inc., McLean, VA; *Doty Associates, Inc., Rockville, MD; *Ketron, Inc., Arlington, VA; *ORI, Inc., Silver Spring, MD.

*Small contracts (under 100K).

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project S0231, ASW Systems Support - Accomplished annual updates of the ASW Master Plan, ASW engagement models and ASW weapons effectiveness models. Commenced transition of project R0905 from ASW to Naval warfare orientation. Project T1038, Acoustic/Non-Acoustic Analysis Support - Library of acoustic data for use by the fleet continues to

Program Element: 65853N
DoD Mission Area: 235 - Naval Warfare Support

Title: Management and Technical Support
Budget Activity: 4 - Tactical Programs

grow and is becoming increasingly an in-house capability. Project R0905, Sea Control Tactical and Operational Analysis - Commenced transition from ASW to Naval Warfare orientation. Development of Master Plan for anti-air warfare, strike warfare, mine warfare, amphibious warfare and special warfare underway with contractual and laboratory assistance.

2. (U) FY 1982 Program: Project S0231, ASW System Support - Continue annual document update and upgrading with emphasis on ASW effectiveness in Carrier Battle Group environment. Conduct analyses to identify deficiencies in ASW Operations Center and in ASW command and control, determine optimum surface ship sonar strategy, resolve ASW issues resulting from FY 1981 programs and new issues as they arise. Project R0905, Sea Control Tactical and Operational Analysis - Master plans for anti-air, strike, mine, amphibious and special warfare will be completed in first draft. New and/or revised methodology for tactical warfare planning will be completed and evaluated. TOMAHAWK targeting and joint Navy/Defense Nuclear Agency, Naval Integrated Attack Planning analysis initiated. Analysis of electronic countermeasures effects on Battle Group operations is being undertaken. The programmatic scope and content of each Naval tactical warfare task area is being determined. Project T1038, Acoustic/Non-Acoustic Analysis Support - The Naval Intelligence Support Center is continuing the Acoustic Characterization and Analysis Program. A Signature Analysis System is being developed to improve and automate acoustic data processing.

3. (U) FY 1983 Planned Program: Project S0231, ASW System Support - Continue annual updates of key ASW source documents. Expand the multi-platform analyses commenced in FY 1980 in areas of Battle Group, convoys, underway replenishment groups, amphibious groups, barriers and choke points effectiveness and identify optimum ASW asset utilizations. Conduct sensor trade-off studies with emphasis on emerging improvements in broadband acoustic sensor systems technology. Project R0905, Sea Control Tactical and Operational Analysis - Transfer completed draft tactical warfare Master Plans to OPNAV for further refinement and subsequent updating. Expand TOMAHAWK targeting analysis to include additional geographic employment scenarios. Complete and promulgate programmatic scope of Naval Warfare task areas. Continue Naval Integrated Attack Planning as well as a tactical nuclear command awareness program in conjunction with Defense Nuclear Agency. Derive Naval force level implications from the Naval Integrated Attack Planning Analysis. Project T1038, Acoustic/Non-Acoustic Analysis Support - Continue automated Signature Analysis System and Acoustic Characterization and Analysis Program effort.

4. (U) FY 1984 Planned Program: Project S0231, ASW System Support - Continue ASW analysis and systems engineering. Project R0905, Sea Control Tactical and Operational Analysis - Continue implementation of revised methodology for Naval tactical warfare planning and TOMAHAWK targeting. Conduct annual appraisals of the major Naval Warfare task areas. Project T1038, Acoustic/Non-Acoustic Analysis Support - Procurement of the Navy Signal Analysis System will be completed. Automation of the Signal Analysis System for specialized functions will commence.

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

6. (U) Milestones: Not applicable.

Project: S0231 Title: ASW System Support
Program Element: 65853N Title: Management and Technical Support
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Program

(U) DETAILED BACKGROUND AND DESCRIPTION: Under the specific technical management of the Manager, ASW Systems Project, contractor and other government activities analytical support is utilized to implement the major portion of the ASW Systems Support (Project S0231) effort. This project ensures that fully supported equipment is developed and produced by the several Systems Commands within the Naval Material Command to satisfy approved ASW operational requirements in a timely manner. Equipment includes those ASW components and systems involved in surveillance, detection, classification, localization, data processing and display, fire control and related computers, integration, and display devices; ASW weapons, launchers, handling and stowage; ASW countermeasures; ASW communications; ASW command and control; and ASW support and training equipment. ASW systems support is provided on a broad warfare basis and involves guidance, direction, and assignment of resources to those charged with development, production, and support of ASW equipment. Each year, the effort includes specific studies and analyses to examine various aspects of the ASW program.

(U) RELATED ACTIVITIES: All ASW efforts.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, White Oak, Silver Spring, MD; Naval Surface Weapons Center, Dahlgren, VA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Air Development Center, Warminster, PA; Navy Postgraduate School, Monterey, CA; Office of Naval Research, Arlington, VA; Naval Ocean Systems Center, San Diego, CA; Naval Ocean Research and Development Activity, Bay St. Louis, MS; U.S. Naval Academy, Annapolis, MD. Contractors: TRW, Inc., McLean, VA; Presearch Inc., Arlington, VA; Automation Industries, Inc. (Vitro Laboratories), Silver Spring, MD; MAR, Inc., Rockville, MD; Applied Management Techniques, Inc., Arlington, VA; Defense Systems, Inc., McLean, VA; Doty Associates, Inc., Rockville, MD; Ketron, Inc., Arlington, VA; ORI, Inc., Silver Spring, MD..

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Conducted annual update of ASW Master Plan, ASW engagement models, and U.S. ASW Weapons Effectiveness documents. Continued to maintain the ASW acoustic and non-acoustic baselines. Continued multi-platform analysis in areas of Carrier Battle Group Effectiveness, optimum ASW asset utilization, and force effectiveness to support ASW Warfare Appraisals. Conducted analyses to determine impact of new threat submarines on engagement opportunities and mission and weapon effectiveness to identify areas where greater emphasis must be applied. Assessed surveillance systems localization capabilities and military worth of planned improvements to the undersea surveillance system. Conducted analyses to identify deficiencies in ASW operational centers and ASW command and control. Conducted an analysis to determine optimum surface ship sonar investment strategy.

Project: S0231 Title: ASW System Support
Program Element: 65853N Title: Management and Technical Support
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Program

2. (U) FY 1982 Program: Continue to update the ASW Master Plan to reflect latest issues. Continue to update and expand U.S. NATO and threat ASW weapons effectiveness documents. Continue to maintain acoustic and non-acoustic baselines and engagement models which are used as the base for numerous analyses. Update and analyze threat data to determine trends. Determine the adequacy of planned ASW capability improvement against the projected threat changes. Expand the multi-platform analyses commenced in FY 1980 in areas of Battle Group to include convoys, underway replenishment groups, amphibious groups, barriers and choke points effectiveness and identify optimum ASW asset utilizations. Continue support of ASW Warfare Appraisal.

3. (U) FY 1983 Planned Program: Continue to update the ASW Master Plan to reflect latest issues. Conduct analyses and assessments of ASW command, control and communications and of undersea surveillance systems with consideration for the interaction between supportive forces to identify areas where greater emphasis must be placed to improve ASW effectiveness. Conduct sensor trade-off studies with emphasis on emerging improvements in broadband acoustic sensor systems technology. Examine submarine ASW stand-off weapon concepts when employed from a surface ship. Conduct specific analyses, assessments and investigations as necessary to resolve new ASW sensors and weapons issues as they arise. Continue support of ASW Warfare Appraisal.

4. (U) FY 1984 Planned Program: Continue update of ASW Master Plan, acoustic and non-acoustic baselines, ASW engagement models, U.S., NATO and threat weapons effectiveness documents. Determine adequacy of current and planned ASW capability against projected threat to support ASW Warfare Appraisal. Conduct specific analyses, assessments and investigation at the system, platform and cross-platform levels as necessary to resolve emerging ASW sensor and weapons issues.

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

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
S0231	ASW System Support	4,201	4,774	5,376	5,480	Continuing	Continuing

Project: T1038 Title: Acoustic/Non-Acoustic Analysis Support
Program Element: 65853N Title: Management and Technical Support
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This project was started in FY 1977 to develop the methodology and data base to improve the fleet tactical capability to detect submarines. Data collected by fixed and mobile sensor systems are analyzed and evaluated in developing methods for extracting data. Results of analysis provide feedback to fleet collectors, support weapon and sensor system developments and provide threat assessments relating to performance characteristics. Analytical methods are applied on this project in evaluating advanced processing techniques. Information derived from this analysis forms the basis for improvement in design and operational characteristics of the next generation of passive sonar suites and surveillance systems.

(U) RELATED ACTIVITIES: The Long Range Acoustic Propagation Project, coordinated and supervised by the Commanding Officer, Naval Ocean Research and Development Activity, Bay St. Louis, MS, is dedicated to supporting technology and to developing supporting technology for tactical anti-submarine warfare sensor systems under Program Element 63785N, Long Range Acoustic Propagation. The Surveillance Environmental Acoustic Support and Tactical Anti-Submarine Warfare Environmental Acoustic Support Projects are designed to provide ocean acoustic data, analyses, models and prediction systems.

(U) WORK PERFORMED BY: In-House: Naval Intelligence Support Center, Suitland, MD, performs as Navy coordinator for acoustic analysis tasks. Contractors: Technology Services Corporation, Silver Spring, MD; Bolt, Beranek and Newman, Arlington, VA; Planning Systems, Inc., McLean, VA; Science Applications Inc., McLean, VA; Hydrotronics, Inc., McLean, VA; ENSCO, Inc., Springfield, VA; Radian, Inc., Austin, TX; and Texas Instruments, Inc., Dallas, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This program was initiated to analyze data. During FY 1977 through FY 1981 the Naval Intelligence Support Center established a data base. Statistical summaries were made of individual ship and ship class data and decision rule analysis was performed in testing and ranking signal parameters. New analysis techniques were applied. Other study areas were dedicated to assessment. Statistical analysis techniques were applied in analyzing the data base.

Project: T1038 Title: Acoustic/Non-Acoustic Analysis Support
Program Element: 65853N Title: Management and Technical Support
DoD Mission Area: 235 - Naval Warfare Support Budget Activity: 4 - Tactical Programs

2. (U) FY 1982 Program: The Naval Intelligence Support Center will continue the Program to develop and expand the current data base, including consideration of characteristics. Algorithm developments will continue under this program to develop and refine methods of extracting features from data. A new Signature Analysis System is being procured to provide a modern capability at Naval Intelligence Systems Command, Other programs will focus on modernization of systems for processing P-3 aircraft data, studies supporting assessment and software developments for improved analysis of sensor data. Validation and certification of will be undertaken and the bounds will be determined. Additionally, new descriptions to the variability in ASW sensor performance will be developed. The first measurements of calibrated magnetic, ELF signatures of Soviet submarines are being conducted under this program. Further development of target strength measurement procedures will be made.

3. (U) FY 1983 Planned Program: Procurement of the Navy Signal Analysis System will be completed. This will provide a Navy capability to: (b) provide systems developers data required to design future sonars and weapons and keep present systems current, (c) reduce or eliminate false target classifications, (d) enable development of programs, and (e) provide technical intelligence. Measurements will be continued.

4. (U) FY 1984 Planned Program: An automated Signal Analysis System will be procured. The feasibility of modifying will be determined and modifications effected if indicated. The priority will be addressed. The feasibility of studies will be investigated. processing will be incorporated in the Signal Analysis System if warranted. Development of concepts, if the priority and feasibility permit, will be initiated. Measurements will be continued.

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

6. (U) Milestones: Not applicable.

Project: T1038
Program Element: 65853N
DoD Mission Area: 235 - Naval Warfare Support

Title: Acoustic/Non-Acoustic Analysis Support
Title: Management and Technical Support
Budget Activity: 4 - Tactical Programs

7. (U) Resource:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
T1038	Acoustic/Non-Acoustic Analysis Support	5,214	5,586	4,727	6,632	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65858N
Title: Tactical Electro Support
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	Addition to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,309	4,210	4,005	4,125	Continuing	Continuing
S0112	Tactical Electromagnetic Program	1,331	974	1,451	1,525	Continuing	Continuing
X0738	Command and Control Architecture Management and Support	2,101	1,601	2,019	2,060	Continuing	Continuing
X0912	Coordination in Direct Support System Engineering and Management Support	877	970	0	0	0	6,882
X1371	Communications Interoperability	0	665	535	540	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element increases effectiveness of Navy command support systems, surveillance systems, and electromagnetic systems and command, control and communications architecture, evolution of passive and active electromagnetic combat systems, surface warfare combat systems and threat emitters. This program element also provides for technical assessments and Fleet evaluations of tactical command, control, and communications equipment for submarines, surface ships and ASW Aircraft operating together in a task force and provides support to ensure that ongoing and new Navy communications programs are harmonized with requirements for interoperability with NATO and Allied Navies in the joint environment.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue support efforts leading towards improving Navy Command and Control and long range technical policies, plans, and concepts; and enhance the interoperability of existing and near operational command and control resources. As this is a continuing program, the above funding profile includes outyear escalation and encompasses all work or development phases not 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: (a) 1981: The total increase of 738 is attributable to (1) minor program decreases due to revised cost estimates and (2) 1037 reprogramming increase into the Command and Control Architecture and Management Support Project (X0738) to complete the Electronic Warfare Master Plan and to complete an urgent study on satellite configurations. (b) for FY 1982: The total decrease of 4,671 is attributable to (1) an 822 decrease in the Command and Control Architecture and Management Support Project (X0738) as a result of efforts completed in FY 1981, (2) In the Tactical Electromagnetic Program (R0112), a decrease of 2303 in FY 1982 due to routine budget adjustments program redirection;

Program Element: 65858N
DoD Mission Area: 353 - Naval Warfare

Title: Tactical Electro Support
Budget Activity: 4 - Tactical Programs

(3) a 512 decrease as a result of revised estimates in Project X1371, Communications Interoperability; and (4) a 1,034 decrease in the Communications in Direct Support Program which ends in FY 1982. The FY 1983 estimates have been finalized in the submission of this years descriptive summary and replace the "TBD" shown in the FY 1982 Descriptive Summary..

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,228	3,571	8,881	TBD	Continuing	Continuing
R0112	Tactical Electromagnetic Program	548	1,556	3,277	TBD	Continuing	Continuing
X0738	Command and Control Architecture and Management Support	3,902	1,064	2,423	TBD	Continuing	Continuing
X0912	Coordination in Direct Support System Engineering and Management Support	778	951	2,004	TBD	Continuing	Continuing
X1371	Communications Interoperability	0	0	1,177	TBD	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 65858N
DoD Mission Area: 353 - Naval Warfare

Title: Tactical Electrc Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element consists of projects which support the increased effectiveness of the Navy's command support systems, electromagnetic systems and surveillance systems. Project R0112 - Tactical Electromagnetic Support includes development of an analytical base to support development, procurement, and installation of the most effective surface combat systems. All aspects of individual weapons, ESM sensors, combat direction, and other functional equipments are collectively assessed for effectiveness as an integrated combat system, including anti-ship missile defense. Using this analytical base, alternative combat systems are assessed as candidates for inclusion in new ship design and ship class modernizations, and support is provided for electromagnetic research and support tasks with potential application to surface warfare systems development. Project X0738 - Command and Control Architecture and Management Support - includes support for a continuing technical assessment of the status and direction of the Navy Command and Control Program, development of command and control architecture, analysis of interactions between advanced anti-jam and conventional tactical communications system modulations, support for analysis required for the development of the Navy Command and Control Plan, support for Navy participation in joint Department of Defense Command and Control programs and projects, support for analysis of a number of command, control and communications policy issues/technical alternatives and activities of a similar nature. Project X0912 - Coordination in Direct Support System Engineering and Management Support - provides technical assessments and integration of various concepts and equipments for the improvement of existing Command, Control and Communications (including navigation) systems during Fleet exercises; program coordination of various Command, Control and Communications development programs and procurement efforts to assure maximum of interoperability of submarines, surface ships and aircraft in various tactical scenarios; development of cost, performance, benefit and risk interrelationships required to determine equipment effectiveness; and supporting the Fleet requirement for assessing new initiatives to provide for baseline improvement. Project X1371 - Communications Interoperability - provides support to ensure common communications system parameters are reached between the U.S. Navy and other members of NATO and Allied Navies.

(U) RELATED ACTIVITIES: Program Element 64711N, Command and Control Systems (Engineering); Program Element 63717N Command and Control Systems (Advanced); Program Element 65866N Command and Control Systems Planning and Engineering Support; Program Element 64554N, Surface Electronic Warfare; Program Element 63797N, Surface Electromagnetic and Optical Systems (Advanced); Program Element 65803N, Electromagnetic Spectrum Management; Program Element 64566N Acoustic Communications (Engineering).

(U) WORK PERFORMED BY: In House: National Security Agency, Ft. Meade, MD; ; Naval Security Group, Washington, DC; Naval Material Command, Washington, DC; Naval Intelligence Command, Alexandria, VA; Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Navy Ships Systems Engineering Center, Washington, DC; Electromagnetic Compatibility Analysis Center, Annapolis, MD; Navy Surface Weapons Center, White Oak, MD; Navy Underwater Systems Center, New London, CT; Naval Air Development Center, Warminster, PA; Naval Ocean Systems Center, San Diego, CA; Naval Telecommunications Command, Washington, DC; Naval Electronic Systems Command, Washington, DC. Contractors: Information Planning Association, Bailey's Crossroads, VA; National Scientific Laboratories, McLean, VA; General Research Corporation, Herndon, VA; Mar, Inc., Rockville, MD; Booz-Allen Applied Research, Bethesda, MD; John Hopkins University Applied Physics Laboratory, Columbia, MD; TRACOR Applied Science, Falls Church, VA; Computer Science Corporation, Falls Church, VA.

Program Element: 65858N
DoD Mission Area: 353 - Naval Warfare

Title: Tactical Electro Support
Budget Activity: 4 - Tactical Programs

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project RG112 - Tactical Electromagnetic Program - Provided surface combatant ship wartime employment analysis upon which to base ship type and weapon systems selection for the Navy shipbuilding programs; provided an analysis of current surface combat effectiveness; provided feasibility of adapting radar imaging to cruise missile seekers; supported advanced hull form study to determine the feasibility of employing advanced hull engineering to reduce the radar cross section of new construction surface combatants. Analyzed the role of remotely piloted vehicles in surface warfare. Supported analysis to correctly characterize Soviet and third world signal warfare theat and detemine optimum U.S. Navy employment of active and passive tactical electromagnetic resources, weapons direction and information systems. Project X0738 - Command and Control Architecture and Management Support - Provided analysis support for overall Command and Control Research and Development program coordination including special studies in support of Weather Service Data Management and Distribution, International Telecommunications Union World Administrative Radio Conferences, to define technical policy parameters and alternatives in the area of communications and command and control; supported development of the Electronic Warfare Master Plan, the update of the Navy Command and Control Plan and the Strategic Command and Control Connectivity and Survivability Study. Project X0912 - Coordination in Direct Support System Engineering and Management Support - Participated in five major Fleet exercises evaluating communication performance, developed measures of effectiveness methodology and published Coordination in Direct Support exercise analysis guide, performed technical assessments on tactical communications and navigation in order for submarines, surface ships and air platforms to operate effectively together. Funding realignments permitted development/procurement of Interim Coordination in Direct Support baseline capability (Integrated Acoustic Communications, Officer in Tactical Command Information Exchange System, Submarine Integrated Antenna Systems, High-frequency Limited Range Intercept) and expendable submarine communications buoys.

2. (U) FY 1982 Program: Project R0112 - Tactical Electromagnetic Program - Conduct major real world and modeled analysis regarding the collective effectiveness possible in the optimum employment of all active and passive shipboard electronic warfare systems, under procurement, against representative threat/warfare scenarios. Results are to be applied toward development of improved tactics and electronic warfare equipment modifications or procurement with particular attention to expendable Remotely Piloted Vehicle, monopulse ECM, LAMPS, MK III combat effectiveness, radar ESM, hull-to-emitter-correlation techniques and underwater communications intercept. Project X0738 - Command and Control Architecture and Management Support - Continue support efforts to identify, analyze and establish Command and Control technical requirements parameters and guidance for critical short range capabilities to meet operational requirements and for mid and long range system development plans; maintain and expand command and control planning and systems engineering analyses and documentation. Initiate development of command and control architecture. Project X0912 - Coordination in Direct Support System Engineering and Management Support, close out all previous work. Publish final report on FY 1981 fleet exercises; transfer data base from contractor facility to Navy computers; complete acoustic communications environmental model. Project is intended to be terminated in FY 1982. Close out efforts to be completed include summary analysis of FY 1981 fleet exercises, transfer of data base to Navy data base management system and completion of acoustic environmental analysis. Project X1371 - Communications Interoperability - Will enable us to to continue and inprove

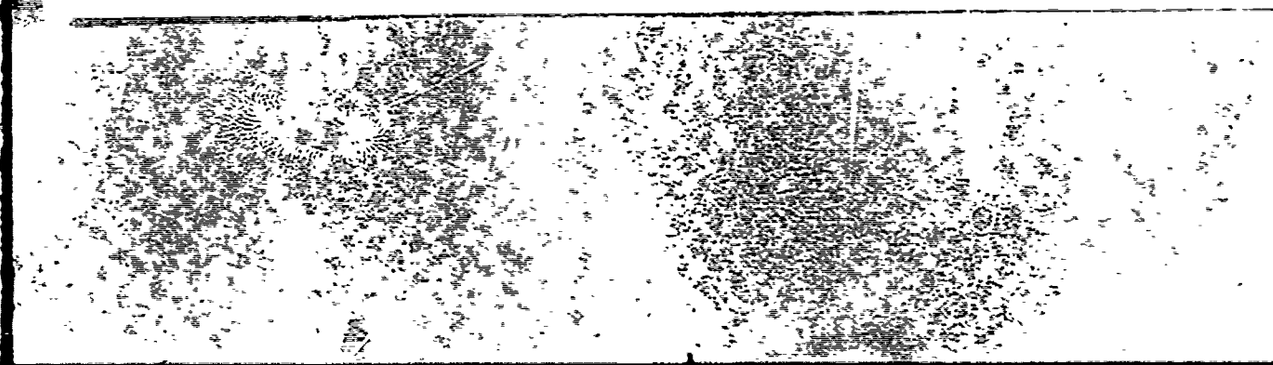
support for U.S. Navy participation in NATO and allied maritime communications forums including initiatives in support of the NATO Long Term Defense Program, to include harmonized efforts in communications signal processing, message handling and automation.

3. (U) FY 1983 Planned Program: Project R0112 - Tactical Electromagnetic Program - Support continuing efforts to analyze various electronic warfare combat support systems, their contribution to the combat effectiveness of surface ships, and to identify potential technical and/or procedural improvements. Project X0738 - Command and Control Architecture and Management Support - Continue to provide support to clarify, analyze and identify solutions to both specific and generalized Command and Control technical policy and requirements questions. Maintain update and expand command and control plans and architecture developed from engineering analyses. Project X0912 - Coordination in Direct Support System Engineering and Management Support - No further work foreseen. Program terminates at the end of FY 1982. Continued analysis not cost effective unless future technological break throughs occur which can change the basic nature of acoustic communications. Project X1371 - Communication Interoperablity - Continue to support efforts and initiatives to maintain and improve U.S. Navy interoperability in communications with NATO allies and other services.

4. (U) FY 1984 Planned Program: Project R0122 - Tactical Electromagnetic Program - Continue support efforts to analyze various electronic warfare combat support systems, their contributions to the combat effectiveness of surface ships, and to identify potential technical and/or procedural improvements. Project X0738 - Command and Control Architecture and Management Support - Continues to provide support to clarify, analyze and identify solutions to both specific and generalized Command and Control technical policy and requirements questions. Maintain and expand the command and control planning and systems engineering analyses and documentation. Project X1371 - Communications Interoperability - Continue to support efforts and initiatives to maintain and improve U.S. Navy interoperability in communications with NATO allies and other services.

5. (U) Program to Completion: All of the Projects under this Program Element exist to provide funding for the resolution of technical policy questions in the area of Command and Control and Tactical Electromagnetic effectiveness and compatibility. As the technology grows and expands new technical policy alternatives will need to be analyzed and resolved. Therefore, these projects will continue on an almost permanent basis. This is a continuing program.

6. (U) Milestones: Not applicable.



FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65867N
Title: C2 Surveillance and Reconnaissance Support
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	3,597	1,694	2,820	5,116	Continuing	Continuing
T0687	Tactical Surface and Air Surveillance	742	0	852	839	Continuing	Continuing
T1034	Tactical Satellite Reconnaissance Office (TENCAP)	2,855	1,694	1,968	4,277	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element provides direction and management of overall ocean surveillance and targeting programs by the Director, Command and Control Programs through contractor and laboratory technical, analytical, managerial and intelligence support.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue management, coordination and integration necessary to develop a properly structured tactical ocean surveillance and tactical support program. 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 T0687, Tactical Surface and Air Surveillance: The decrease of 472 in FY 1981 is due to Navy reprogramming actions. The decrease of 2,499 in FY 1982 is due to Congressional action as reflected in the FY 1982 Appropriations Bill. The decrease of 2,079 in FY 1983 is due to a program scope change to reflect changing Navy requirements. Project T1034, Tactical Satellite Reconnaissance Office: The increase of 818 in FY 1981 was necessary to accommodate a Department of Defense directed higher classification program. The decrease of 22 in FY 1982 and the increase of 120 in FY 1983 due to refinement of cost estimates noted in escalation adjustments.

Program Element: 65867N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: C2 Surveillance and Reconnaissance Support
Budget Activity: 4 - Tactical Programs

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,716	3,251	4,251	4,779	Continuing	Continuing
T0687	Tactical Surface and Air Surveillance	2,557	1,214	2,499	2,931	Continuing	Continuing
T1034	Tactical Satellite Reconnaissance Office (TENCAP)	1,159	2,037	1,716	1,848	Continuing	Continuing

(U) OTHER APPROPRIATIONS: None.

Program Element: 65867N
DoD Mission Area: 323 - TIARA for Naval Warfare

Title: C2 Surveillance and Reconnaissance Support
Budget Activity: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: Project T0687, Tactical Surface and Air Surveillance: Provides a major analytic tool to define future plans and efforts for Navy ocean surveillance. Planning is necessary to provide a programmatic structure for measuring current, planned and future programs in order to assess the Navy's ocean surveillance and targeting needs. Project T1034, Tactical Satellite Reconnaissance Office: Was established by Congressional direction to exploit all available National and Service sensor systems for tactical to fleet operational commanders. This project also provides support to fleet exercises, which will provide background for development of modifications to existing programs and assists in establishing/validating requirements for new programs.

(U) RELATED ACTIVITIES: All research and development related to tactical ocean surveillance and reconnaissance. Specific related program elements are: Program Element 63717N, Navy Command and Control System, Afloat; Program Element 64711N, Navy Command and Control System, Ashore Node; Program Element 33109N, Fleet Satellite Communications; Program Element 64255N, Air Electronics Warfare; and Program Element 63763N, Integrated Tactical Surveillance System.

(U) WORK PERFORMED: Work performed under compartmented contracts.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: Project T0657, Tactical Surface and Air Surveillance: Expanded upon the initial analysis performed in 1978. Deficiencies in ocean surveillance were identified and specific analysis efforts were initiated to resolve these problems. The Navy lead laboratory (Naval Ocean Systems Center) was established and ocean surveillance was designated as a supporting warfare task in Naval Warfare Publication-1. Provided analytical support for preparation of the Navy Command and Control Plan. Project T1034, Tactical Satellite Reconnaissance Office: Provided support to improve tactical utilization of current and future national systems through special studies and fleet exercises. Of special interest was the development of a series of Tactical Tasking Plans designed to assist the operational commander in exploiting national systems in specific geographic areas. This program also planned and provided support for development of improved national system processing upgrades, and has developed an automated system for tasking national sensors.

2. (U) FY 1982 Program: Project T0687, Tactical Surface and Air Surveillance: Planned efforts will be curtailed as no funding was appropriated for FY 1982. Project T1034, Tactical Satellite Reconnaissance Office: Will continue the tactical applications of National systems. Engineering analyses will include investigation of advanced processing techniques, current system improvements and new system developments.

Program Element: 65867N
Title: C2 Surveillance and Reconnaissance Support
DoD Mission Area: 323 - TIARA for Naval Warfare
Budget Activity: 4 - Tactical Programs

3. (U) FY 1983 and FY 1984 Planned Program: Project T0687, Tactical Surface and Air Surveillance: Will continue to provide the managerial and technical support necessary to ensure a fully capab'- Navy ocean surveillance system. The Navy Command and Control Plan, with its ocean surveillance assessment, will be updated. Project T1034, Tactical Satellite Reconnaissance Office: Will continue to provide support for the tactical exploitation of national sensor systems and provide Navy requirements to the executive agency responsible for the design and development of these systems. Joint and fleet exercises will continue to be utilized as a test bed for assessing the utility of national systems to the tactical commander and validating requirements for improved data dissemination. Tactical Exploitation of National Capabilities system upgrades will be initiated in 1984 on the basis of the utility assessment and requirement validation.

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

5. (U) Milestones: Not applicable.

FY 1983 [illegible] DESCRIPTIVE SUMMARY

Program Element: 65871M
Title: Marine Corps Tactical Exploitation of National Capability
DoD Mission Area: 322 - TIARA for Tactical 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	255a/	248	360	374	Continuing	Continuing
C1424	Tactical Exploitation of National Capabilities (TENCAP)	255a/	248	360	374	Continuing	Continuing

a/ Funded through Navy Tactical Exploitation of National Capability Funds, Program Element 65867N, Command and Control Surv/Recon Support, T1034, Tactical Satellite Recon Office.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides RDT&E funds for activities designed to enhance the ability of tactical Marine Corps Forces to exploit the capabilities of national intelligence gathering systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue and expand ongoing liaison, training and technical efforts; initiate technical interface actions and update program documentation/plans. 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: The FY 1983 increase of 99 above the previous estimate is due to the increased tasking and utilization of Tactical Exploitation of National Capability assets foreseen as a result of the education and training efforts and the new capabilities provided by other service development efforts.

(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	180a/	300a/	251	261	Continuing	Continuing
C1424	Tactical Exploitation of National Capabilities	180a/	300a/	251	261	Continuing	Continuing

a/ Funded through Navy Tactical Exploitation of National Capability Funds, Program Element 65867N, Command and Control Surv/Recon/Support, T1034, Tactical Satellite Recon Office.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element:65871M

Title: Marine Corps Tactical Exploitation of National Capability

DoD Mission Area: 322 - TIARA for Tactical Land Warfare

Budget Area: 4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Marine Corps Tactical Exploitation of National Capability Program is a Congressionally directed effort to maximize tactical exploitation of national reconnaissance systems. Since Congress directed establishment of Service Tactical Exploitation of National Capability programs in August 1977, Marine Corps Tactical Exploitation of National Capability efforts have been funded out of Navy Tactical Exploitation of National Capability funds. With completion of the Marine Corps Tactical Exploitation of National Capability Master Plan and approval by the Assistant Commandant and Chief of Staff in November 1979, the Marine Corps Tactical Exploitation of National Capability Program attained separate identity and status. Accordingly, Marine Corps Tactical Exploitation of National Capability Program funds were separately identified beginning in 1982. Marine Corps Tactical Exploitation of National Capability Program accomplishment requires close and continuous liaison with national intelligence agencies, other military Services Tactical Exploitation of National Capability programs, Service R&D efforts in Tactical Exploitation of National Capability areas, industry and contractors engaged in Tactical Exploitation of National Capability efforts, and a myriad of committees and sensitive activities in the imagery, signals intelligence, computer and communications fields as well as training and familiarization with advanced systems. One facet of the Marine Corps Tactical Exploitation of National Capability Program includes participation in the formal Joint Chiefs of Staff (JCS) test plan for evaluating Tactical Exploitation of National Capability under various operational environments. Execution of the Marine Corps Tactical Exploitation of National Capability Program involves specialized contractor support to ensure continuity of management, updating and revision of the Tactical Exploitation of National Capability Master Plan, technical/engineering assessments of new systems and their tactical utility to the Marine Corps (to include Congressional tactical impact statements) and national systems and connectivity with organic intelligence and communications systems.

(U) RELATED ACTIVITIES: Other Services' Tactical Exploitation of National Capability programs. All Source Imagery Processor.

(U) WORK PERFORMED BY: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 AND PRIOR ACCOMPLISHMENTS: Note: Accomplished with Navy Tactical Exploitation of National Capability funds. In response to the August 1977 Congressional Joint Appropriations Report, the Marine Corps initiated a broad series of actions designed to develop a Marine Corps Tactical Exploitation of National Capability capability. The Marine Corps' role within the Navy Tactical Exploitation of National Capability program was formalized; liaison and discussions with other Service Tactical Exploitation of National Capability offices began, and initial efforts to upgrade Tactical Exploitation of National Capability related instruction were initiated. In 1979, the Marine Corps Tactical Exploitation of National Capability Master Organization and Exercise Plans were completed, staffed and approved. These plans now constitute the charter of the Marine Corps Tactical Exploitation of National Capability Program. FY 1980 and 1981 activities included: forwarding to the Congress of three studies that assess the tactical impact on the Marine Corps of seven new or improved national reconnaissance systems; revision and consolidation of the Tactical Exploitation of National Capability plans; initiation of a study to determine Marine Corps

Program Element:65871M

Title: Marine Corps Tactical Exploitation of National Capability

DoD Mission Area: 322 - TIARA for Tactical Land Warfare

Budget Area: 4 - Tactical Programs

Tactical Exploitation of National Capability capabilities for contingency plans and operations in the 1980-1987 time frame; the first annual Tactical Exploitation of National Capability/Intelligence Planning Conference; expanded training activities; actions aimed at resolution of national systems tasking procedures, and production of a Marine Corps Intelligence Architecture.

2. (U) FY 1982 Program: Continue liaison and discussion with Tactical Exploitation of National Capability and national intelligence organizations. Continue and expand Tactical Exploitation of National Capability training and education. Continue to provide tactical impact statements to the Congress. Expand to two Tactical Exploitation of National Capability/Intelligence Planning Conferences. Initiate a national/tactical intelligence interface study. Revise and update the consolidated Tactical Exploitation of National Capability Master Plan.

3. (U) FY 1983 Planned Program: Continue liaison and discussions with Tactical Exploitation of National Capability and national intelligence organizations; continue Tactical Exploitation of National Capability training and education; submit tactical impact statements and other Tactical Exploitation of National Capability-related assessments to the Congress and other higher authority as directed; conduct Tactical Exploitation of National Capability/Intelligence Planning Conferences. Initiate follow-on action to implement appropriate findings of the national/tactical intelligence interfaces study within the framework of the Marine Corps intelligence architecture; other actions as appropriate.

4. (U) FY 1984 Planned Program: Continue liaison and discussions with Tactical Exploitation of National Capability and national intelligence organizations· continue Tactical Exploitation of National Capability training and education; submit tactical impact statements and other Tactical Exploitation of National Capability-related assessments to the Congress and other higher authority as directed; conduct Tactical Exploitation of National Capability/Intelligence Planning Conferences. Initiate other actions as appropriate.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 31309N
Title: Intelligence Support Center
DoD Mission Area: 312 - General Defense Intelligence Programs
Budget Activity: 5 - Intelligence and Communications

(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	322	237	0	0	237	1,777
Z0983	Improved Intelligence Analyst Productivity	322	237	0	0	237	1,777

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Develop capabilities to reduce analyst time and manpower in the exploitation and presentation of varied information and data of mixed format and source. This work will: (1) identify and analyze the job activities of analysts, (2) develop measures of analyst productivity to be used in later tests, (3) identify new approaches with a high probability of improving analyst productivity, (4) conduct experiments to test and evaluate these approaches and (5) implement resulting findings.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Not applicable. Funds are not requested for FY 1983 on the basis that considerable revisions will be made to analyst job activities as a result of the implementation of the Navy Shore Establishment Manpower Planning System (SHORSTAMPS) programs during FY 1982 and FY 1983. Performance and measurement data will not be readily available until the end of FY 1983.

(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 program was reduced by 1 as a result of Navy action on Congressionally imposed reduction for escalation. FY 1982 program was reduced further by 3 for a Navy decrease in 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
	Program Element 31021N						
Z0983	Improved Intelligence Analyst Productivity	292	323	240	0	0	1,540

(U) OTHER APPROPRIATIONS FUNDS: Not Applicable.

Program Element: 31309N
DoD Mission Area: 312 - General Defense Intelligence Programs

Title: Intelligence Support Center
Budget Activity: 5-Intelligence and Communication

(U) DETAILED BACKGROUND AND DESCRIPTION: The expansion of the Soviet Navy has placed an increased burden on the intelligence community to determine the capability of Soviet weapon and sensor systems and the threat they pose to the U.S. The wide variety of weapons systems to analyze, the ever increasing complexity of these system and the usual time sensitivity of intelligence production are taxing the ability of Naval Intelligence to meet its assigned tasks within imposed manpower constraints. This necessitates the investigation and research into the possibility of improving the judgement and decision process of the analyst.

(U) RELATED ACTIVITIES: Integrated Automated Intelligence Processing System (IAIPS) is introducing State of the Art Automatic Data Processing equipment to the analyst. This program will help the analyst prepare to take full advantage of these improvements.

(U) WORK PERFORMED BY: In-House: Navy Personnel Research and Development Center, San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: New start in FY 1979. Initial contract requested to identify and analyze job activities of analyst and develop measures of analyst productivity. Identified several approaches and alternatives for improving analyst productivity.

2. (U) FY 1982 Program: Perform test to evaluate new approaches to analysis with high probability of increasing productivity.

3. (U) FY 1983 Planned Program: Not applicable.

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

5. (U) Program to Completion: Provide prototype system with measurement standards and criteria for systems compatability and interface with Integrated Automated Intelligence Processing System.

6. (U) Milestones: Not applicable.

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FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 33109N
Title: Satellite Communications
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

(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	5,357	36,580	1,632	905	946	264,989***
X0728	Extremely High Frequency Satellite Communications System	1,845*	34,198	**	**	**	45,256***
X0730	Advanced Shipboard Super High Frequency	1,900	1,054	1 632	905	946	72,454
X0731	Fleet Satellite Communications	1,612	1,328	0	0	0	147,279

*Additional FY 1981 funding for this effort provided in Program Element 11403N, HYDRUS.
**Funded under Program Element 64577N in FY 1983 and beyond.
***Through FY 1982 for Project X0728.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides the resources necessary to support the development, acquisition, operation, maintenance, and management of equipments supporting approved Navy satellite communications programs. Satellite communications systems include space vehicles and associated terminals, control facilities/services, interconnect and technical facilities as designated. Implementation of these systems addresses the fleet requirement for improved worldwide satellite communications command and control.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development and incorporate enhancements for the automatic Demand Assigned Multiple Access Fleet Satellite Communications System for application aboard submarines and aircraft. Continue development of Super High Frequency System integration and system control, along with development and testing of AN/WSC-6 terminal interface equipment. An increase of 578 thousand from FY 1982 for Advanced Shipboard Super High Frequency development reflects the requirement to repeat portions of the AN/WSC-6 and OM 55 operational evaluation. The Extremely High Frequency Satellite Communications Project is funded under Program Element 64577N in FY 1983 through FY 1987. The funding profiles for the Super High Frequency and Fleet Satellite Communications projects include escalation and encompass all work or development phases now planned or anticipated through FY 1987 and FY 1982 respectively, but these projects may be extended.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and in this Descriptive Summary reflect a total program element funding increase in FY 1981 of only 279.

Program Element: 33109N
DoD Mission Area: 363 - Common User Communications

Title: Satellite Communications
Budget Activity: 5 - Intelligence and Communications

Intraprogram element restructure increased Navy Fleet Satellite Communications System funding by 483 for software development to expedite the Demand Assigned Multiple Access and the Officer in Tactical Command Information Exchange Subsystem programs. This increase was offset by a program reduction of 33 for escalation adjustments. A combination of interprogram adjustments and decrease in allowable escalation rates resulted in a reduction of 17 in FY 1981 in the Advanced Shipboard Super High Frequency program. A reduction of 154 in the Navy Extremely High Frequency Satellite Communications program in FY 1981 was the result of reduction of allowable escalation and a general shortage of RDT&E funds among several programs. The major change in FY 1982 was an increase (by Congress) of 24,291 in the Extremely High Frequency Satellite Communications System for initial development of a space package. The Fleet Satellite Communications Program decreased by 271. A reduction in allowable escalation reduced the Super High Frequency Project by 60. In FY 1983, the Extremely High Frequency Satellite Communications Program was moved to Program Element 64577N, reducing this Program Element (33109N) by 22,832. Fleet Satellite Communications was zeroed in FY 1983 for a reduction of 710. Advanced Shipboard Super High Frequency Program was increased by 586 to provide funds for a repeat of portions of the technical/operational evaluation for AN/WSC-6 and OM55.

(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	16,983	5,078	12,620	24,464	65,288	327,019
X0728	Navy Extremely High Frequency Satellite Communications System	5,138	1,999*	9,907	22,708	63,675	107,502
X0730	Advanced Shipboard Super High Frequency	5,501	1,917	1,114	1,046	1,613	71,707
X0731	Fleet Satellite Communications	6,344	1,162	1,599	710	0	147,810

*Additional FY 1981 funding for this effort provided in Program Element 11403N, HYDRUS.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	29,897	49,773	49,635	58,688	91,943*	Continuing
WPN	27,000	65,100	231,300	123,000	168,800	999,380
(Quantity)	**	**	(2)	(1)	**	

*Through FY 1987. **Various and numerous equipments including terminals, antennas, spacecraft and launch vehicles.

Program Element: 33109N
Title: Satellite Communications
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: The Navy has an urgent requirement for reliable long range communications. Satellite relay can provide reliable communications in the Ultra High Frequency and Super High Frequency bands to satisfy this requirement. The Fleet Satellite Communications (Project X0731) system will partially satisfy the Navy's most urgent near term Ultra High Frequency Satellite Communications requirements and will provide satellite capacity for operational use by high priority Air Force users. Implementation entails development efforts to provide anti-jam protected fleet broadcast service to all Navy ships and provide command and control links for computer to computer exchange of digital data among shore stations, fleet ballistic missile submarines, aircraft carriers, cruisers, selected aircraft, other ships and submarines. Satellite capacity provides support for selected Air Force requirements, including Presidential, Airborne Command Post, Strategic Air Command, and emergency mission support communications. The space segment consists of a constellation of four channelized satellites placed in geostationary orbit. Beginning in April 1976, interim world-wide naval Ultra High Frequency satellite communication was obtained through leased Ultra High Frequency services from COMSAT General Corporation. Initial Operational Capability of the Fleet Satellite Communications space segment was attained in FY 1978 with the launch of spacecraft #1. Spacecraft #2, #3, #4, and #5 were launched in FY 1979 through FY 1981. The spacecraft designed mission life is five years. Follow-on space segment service for the Fleet Satellite Communications system will be provided by a Leased Satellite system. Three more FLTSATCOM Satellites will be procured to provide continuity of service to Air Force AFSATCOM users until MILSTAR satellites are available and also to provide additional UHF capacity for anticipated new UHF users. The Navy Extremely High Frequency Satellite Communications System, Project X0728, undertakes the development of modest cost, widely deployed Extremely High Frequency terminals to provide for essential anti-jam ship-to-ship satellite communications and covert submarine satellite communications. In addition, under the Advanced Shipboard Super High Frequency project (X0730), the Navy is assigned responsibility within the Defense Satellite Communications System (Super High Frequency point-to-point) for the operation and maintenance of eight earth terminals and the development and procurement of shipboard Super High Frequency Terminals for specified command and control functions afloat. The Lightweight Super High Frequency Shipboard Terminal AN/WSC-6, associated spread spectrum modulator-demodulator, and multiplexing equipments are in development for use on major combatant ships and on Surface Towed Array Sensor System equipped ships. These shipboard Super High Frequency terminals, modular in configuration, will operate with the Defense Satellite Communication System satellites and follow-on Super High Frequency systems to fulfill high level command and control and data relay requirements.

(U) RELATED ACTIVITIES: The development presently being undertaken interfaces with Defense Communications Agency, Army, and Air Force satellite communications development groups. The Air Force Space Division is responsible for the acquisition, launch, test and evaluation of the Fleet Satellite Communications spacecraft. The Surface Towed Array Sensor System Program (Program Element 64789N, Project X0758) shares in the development of common use Super High Frequency terminals to be used on Surface Towed Array Sensor System equipped ships. The Communications Automation Project (Program Element 24163N Project X0725) develops the Navy Modular Automated Communications System that interfaces with the Fleet Satellite Communications system. The Ship-to-Shore/HYDRUS project (Program Element 11403N Project X0794) shares in the development of the Extremely High Frequency Satellite Communications System.

Program Element: 33109N
Title: Satellite Communications
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, D.C.; Naval Ocean Systems Center, San Diego, CA; Naval Electronic Systems Engineering Center, Vallejo, CA; Naval Electronic Systems Engineering Activity, St. Inigoes, MD: Naval Air Systems Command, Washington, D.C.; Naval Sea Systems Command, Washington, D.C.; Naval Avionics Center, Indianapolis, IN; Naval Ship Engineering Center, San Diego, CA; Navy Space Systems Activity, Los Angeles, CA; Fleet Combat Direction Systems Support Activity, San Diego, CA; plus minor efforts at numerous others. Contractor: TRW, Redondo Beach, CA; Aerospace Corporation, Los Angeles, CA; ITT Defense Communications Division, Nutley, NJ; Magnavox Research Laboratories, Torrence, CA; Motorola, Scottsdale, AZ; E-Systems (ECI Division), St. Petersburg, FL; Computer Sciences Corporation, Falls Church, VA; Harris Corporation, Melbourne, FL; Raytheon Company, Sudbury, MA; Rockwell International Corporation, Anaheim, CA; E-Systems, Garland, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Navy Ultra High Frequency Satellite Communications Research Development Test and Evaluation effort prior to 1970 involved participation in the Tri-Service Satellite Communications Program. A Development Concept Paper for the Fleet Satellite Communications System was approved by the Deputy Secretary of Defense in September 1971. The contract for the Fleet Satellite Communications spacecraft development was awarded to TRW Systems Inc. in November 1972. The contract was awarded for the AN/SSR-1 Satellite Signal Receiver Engineering Development Model to Motorola in July 1971. The contract for the AN/WSC-3 Ultra High Frequency Satellite Communication terminal was awarded in November 1971. Development was initiated on Fleet Satellite Communication subsystems: Submarine Satellite Information Exchange System FY 1972, Common User Digital Information Exchange Subsystem FY 1974, Tactical Intelligence Subsystem FY 1975, Anti-Submarine Warfare Information Exchange Subsystem (formerly Tactical Support Center Information Exchange Systems and more recently renamed Officer in Tactical Command Information Exchange Subsystem) FY 1976 and Secure Voice FY 1974. Submarine Satellite Information Exchange System was awarded Provisional Approval for Service Use in November 1976. Development was initiated in FY 1976 for Demand Assigned Multiple Access system for use with the Fleet Satellite Communication and Leased Satellite Systems. Full scale verification testing of Fleet Satellite Communications System terminals was accomplished utilizing leased satellite channels on a commercial satellite. The first Fleet Satellite Communications spacecraft was launched 9 February 1978, the second was launched 4 May 1979, the third was launched 17 January 1980, the fourth was launched 30 October 1980, and the fifth was launched 6 August 1981. The Tactical Intelligence Information Exchange Subsystem completed operational evaluation and was given provisional approval for service use in FY 1979 and full approval for service use in FY 1980. Under the Advanced Shipboard Super High Frequency project, a contract was awarded to ITT for the terminal (AN/WSC-2) Advance Development model in October 1970. A subsequent contract was awarded for Engineering Development of Service Test Models of the terminal (AN/WSC-2) along with a contract for the OM-55/WSC-1 spread spectrum modem. Development of a lightweight Super High Frequency Satellite Communications terminal (AN/WSC-6) was begun in FY 1976. Evaluation of the British Single Channel Operational Terminal 1 Super High Frequency Terminal was performed FY 1976-79. In FY 1978, in a move to respond to changing requirements and to improve cost effectiveness, a decision was made to proceed with the development of only the less costly terminal (AN/WSC-6) to meet Super High Frequency requirements of shipboard users. During FY 1977 the Advanced Satellite Communications project developed the design philosophy and techniques for an improved satellite

communications system with robust anti-jam and low probability of intercept capabilities to meet essential fleet command and control requirements. Concept definition was initiated in FY 1979 for development of an advanced Extremely High Frequency Satellite Communications System to achieve anti-jam beyond line of sight communications for Navy combatants. Three parallel concept definition/concept validation contracts were awarded to Harris, Rockwell, and Raytheon in FY 1979. Concept definition was completed in FY 1980. The Fleet Satellite Communication effort included testing of Information Exchange System/Demand Assigned Multiple Access compatibility which resulted in an approval for service use of the Demand Assigned Multiple Access System on 30 June 1981. Advanced Shipboard Super High Frequency effort included completion of shipboard testing and the granting of a waiver for long lead procurement of the Surveillance Towed Array Sensor version of the AN/WSC-6. The Fleet Satellite Communication effort also included Service Approval of the ON-143(V)6 on 29 April 1981. This is the principle equipment in the Officer in Tactical Command Information Exchange Subsystem. Concept validation continues under the Extremely High Frequency project with funding provided from other programs.

2. (U) FY 1982 Program: Under the Fleet Satellite Communications Satellite project, development will continue on submarine and aircraft Demand Assigned Multiple Access system capability and a system malfunction detection subsystem. Under the Advanced Shipboard Super High Frequency project, effort will continue with Operational Evaluation and request for approval for service use of the AN/WSC-6 terminal. Expanded capabilities and flexibility of the AN/WSC-6 terminal will be developed and tested. A satellite communication system controller will be developed. The Navy Extremely High Frequency Satellite Communications System project will enter full scale development with 2 system contractors providing 6 service test model terminals each for competitive evaluation on ships, submarines and at shore sites.

3. (U) FY 1983 Planned Program: Under the Advanced Shipboard Super High Frequency Satellite Communications project, effort will continue to resolve AN/WSC-6 antenna reliability and recertification of the combined AN/WSC-6/OM55 aboard the KITTY HAWK, improve shipboard terminal interfaces, provide system integration with the Defense Satellite Communications program and continue development and test of the adaptive multiplexer and Navy subnet controller. The Navy Extremely High Frequency Satellite Communications project will be funded under Program Element 64577N.

4. (U) FY 1984 Planned Program: Navy subnet control system will be further developed to interface with previously developed shipboard control hardware. Burst error codes interface to OM-55 will be developed. Initial development will begin on advanced anti-jam for Super High Frequency transition to Extremely High Frequency. Development will begin on 2.4 meter antennas, a more automated communication system for Super High Frequency including Tactical Intelligence interface, and automated baseband and consolidated control for shipboard systems.

5. (U) Program to Completion: Complete Advanced Shipboard Super High Frequency terminal improvements. Continue to develop improvements to all satellite communications systems as fleet requirements arise and as threat analyses dictate.

Program Element: 33109N
Title: Satellite Communications
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

6. (U) Milestones:

	MILESTONES		DATE
1.	Launched First Fleet Satellite Communications System Spacecraft		9 FEB 1978
2.	Tactical Intelligence Subsystem Operational Evaluation		DEC 1978
3.	Launched Second Spacecraft Fleet Satellite Communications System Spacecraft		4 MAY 1979
4.	Launched Third Spacecraft Fleet Satellite Communications System Spacecraft		17 JAN 1980
5.	Launched Fourth Spacecraft Fleet Satellite Communications System Spacecraft		30 OCT 1980
6.	AN/WSC-6 Terminal Operational Evaluation		1st QTR FY 1981
7.	Approval for Service Use Granted for ON-143(V)6		29 APR 1981
8.	Demand Assigned Multiple Access Approval for Service Use Granted		30 JUN 1981
9.	Launched Fifth Spacecraft Fleet Satellite Communications System Spacecraft	(4th QTR FY 1981)*	6 AUG 1981
10.	AN/WSC-6 Terminal with Spread Spectrum Modem Technical Evaluation		4th QTR FY 1982

*Date shown in FY 1982 Program Element Descriptive Summary.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 33126N
Title: Long Haul Communications - Defense Communications System
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

(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	2,423	1,188	1,965	825	Continuing	Continuing
X0732	Architecture and Integration	310	0	0	0	0	1,066
X0733	Supervisory/Technical Control	1,030	689	865	825	Continuing	Continuing
X1285	Secure Voice Improvement Program	0	499	0	0	0	499
X1340	Commander in Chief Initiatives	1,083	0	0	0	0	1,083
X1691	Movement Information Network	0	0	1,100	0	0	1,100

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Defense Communications Agency is programming new technologies for the Defense Communications System switched networks and advanced techniques for communications control. A high degree of interoperability between the Naval Telecommunications System and the Defense Communications System is essential to command and control of Naval Forces by the National Command Authority/Commander-in-Chief. Interoperability is effected at the interface points of the Naval Telecommunications System with the Defense Communications System which occurs at major Naval Telecommunication Stations. This element will develop and design, on a system-wide basis, more efficient management and technical control at the communications station to provide for maximum standardization and interoperability with the Defense Communications System and will develop and start installation of a logistics data transmission network for multiservice use in the European theater.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Develop additional software to augment the management and reporting functions developed in FY 1982 for Supervisory/Technical Control (Project X0733). A new start, Project X1691, the Movement Information Network, has been funded for $1100 thousand. Funds for this project will be transferred to the Defense Communications Agency under Program Element 33126K. 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: A decrease of 368 in FY 1982 was due to inflation adjustments and the cancellation of the Architecture and Integration Program and transfer of Commander in Chief Initiatives (X1340) to the Defense Communications Agency. In FY 1983 an increase of 385 is a result of the cancellation of the Architecture and Integration Program (X0732) (-356) and the joint operational testing plans for the Secure Voice Improvement

Program Element: 33126N
DoD Mission Area: 363 - Common User Communications

Title: Long Haul Communications - Defense Communications System
Budget Activity: 5 - Intelligence and Communications

Program (X1285) (-507), an increase of 148 in the Supervisory/Technical Control (X0733) between last year's and this year's estimates for FY 1983 expenditures due to additional program requirements, and an increase of $1100 due to the addition of Project X1695, the Movement Information Network. Expenditures in FY 1981 increased by 483 to finance development of a fiber optic communications link under Architecture and Integration Program (X0732) and to support Commander in Chief Initiatives for command and control project 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	586	1,940	1,556	1,580	Continuing	Continuing
X0732	Architecture and Integration	176	316	343	356	Continuing	Continuing
X0733	Supervisory/Technical Control	410	533	708	717	Continuing	Continuing
X1285	Secure Voice Improvement Program	0	0	505	507	Continuing	Continuing
X1340	Commander in Chief Initiatives	0	1,091	0	0	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 33126N
DoD Mission Area: 363 - Common User Communications

Title: Long Haul Communications - Defense Communications System
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: The Defense Communications Agency is programming new technologies for the Defense Communications System switched networks and developing advanced communications system control techniques. These technologies are not in general adaptable for shipboard application. However, a high degree of interoperation, on an automatic basis, between fleet units and the shore communications systems of the Defense Communications System is essential for effective command and control of Naval Forces by the National Command Authority/Commander-in-Chief. Interoperation between the fleet units and the Defense Communications System is effected at Naval Communications Stations which serve at the interface points. These interface points include portions of Defense Communication System transmission systems and switched networks for which each Naval Communications Station has management and technical control responsibilities. Manual procedures employed within the present Naval Telecommunications System for management and control are inadequate to provide the required interoperability. The existing system does not provide the capabilities to effectively perform the functions of network control, circuit restoration/extension, traffic control and routing, performance assessment, status monitoring, and technical control. This project will develop a Supervisory Control Subsystem that will provide for the automated management and control of the communications resources at the Naval Communications Station. This will facilitate standardization of the Naval Telecommunications System shore stations and provide the maximum capability for interoperation of these systems with the Defense Communications System, additionally a logistics data transmission network will be established to support fleet operations in the European theater.

(U) RELATED ACTIVITIES: The Defense Communications System program plans for Automated Digital Network II and TRITAC Interoperability Requirements will provide technical basis for interoperability design and specification. The Communications Performance Monitoring-Assessment System being developed for the Defense Communications System by the Air Force under PE 33126F, Long Haul Communications will provide concepts and technology for automated quality control measurements. The System Planning, System Control, Nodal Control, and Equipment Support concepts and technology being developed under PE 28010F, TRITAC, by the Air Force will provide the basis for management and technical control of tactical circuits and interface of control elements.

(U) WORK PERFORMED BY: In House: Naval Ocean Systems Center, San Diego, CA (Lead Laboratory); Naval Electronics System Test and Evaluation Activity, St. Inigoes, MD. Contractors: General Telephone and Electronics, Sylvania, Needham, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Under Project X0732, Architecture and Integration, development of a fiber optic transmission system was initiated and plans developed for its installation and validation testing in Guam. The bulk of the FY 1979 and FY 1980 funds for Project X0733, Supervisory/Technical Control Subsystem, provided for conceptual studies and the structuring of a development approach to respond to the Operational Requirements. These efforts resulted in a competitive award for the validation phase of the Supervisory Control Subsystem development. Efforts during this period also produced alternative

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DoD Mission Area: 363 - Common User Communications

Title: Long Haul Communications - Defense Communication System
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system architecture conceptual designs and identified the software and/or hardware additions and changes needed to permit stand-alone implementation of Defense Communications System Automatic Technical Control Measurement Acquisition elements. The Program Commanders-in-Chief Atlantic and Pacific initiated development of command and control systems as they became necessary.

2. (U) FY 1982 Program: Project X0733, Supervisory/Technical Control Subsystem efforts will concentrate upon developing the automated data base and resource management functions of the program. It will include automated frequency management and satellite assets management, and automated logging, reporting and report generation systems. Project X1285, Secure Voice Improvement Program, will initiate joint operational testing at Fort Huachuca, Arizona and the Naval Telecommunications System Test Node at San Diego, California.

3. (U) FY 1983 Planned Program: Project X0733, Supervisory/Technical Control Subsystem efforts will continue building upon the results of the FY 1982 work, providing additional software to augment the management and reporting functions previously developed. A new start in FY 1983, the Movement Information Network (Project X1691), will provide funds to the Defense Communications Agency to expand this logistics data transmission system into the western Mediterranean at the following sites: Naples and Sigonella, Italy and Rota, Spain.

4. (U) FY 1984 Planned Program: Full scale development of the Supervisory Control Subsystem under Supervisory/Technical Control program will be initiated. Studies and evolutionary development of command and control systems will continue.

5. (U) Program to Completion: Decisions and recommendations will be made for technology investigations which will provide new areas for overall systems improvement. Government testing leading to service approval will also proceed (in stages) through the integration of modified technical control equipment to fulfill Naval Telecommunications System performance assessment requirements and a distributed processing backbone network to provide system control and coordination. Phase II and Phase III of the Supervisory Control Subsystem under the Supervisory/Technical Control program will bring the development of automated performance assessment, rapid dynamic configuration management and overall system integration, including acquisition and integration of necessary hardware and software at the Naval Communications Area Master Station and selected Naval Communications Stations. Initial Operational Capability for Phase III is anticipated in FY 1990.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 33401N
DoD Mission Area: 364 - COMSEC

Title: Communications Security
Budget Activity: 5 - Intelligence and Communication

(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	9,241	13,472	17,091	13,195	Continuing	Continuing
X0703	SECURE TELEMETRY	0*	371	400	426	Continuing	Continuing
X0734	COMMUNICATIONS SECURITY R&D	4,204	3,946	4,704	3,943	Continuing	Continuing
X0746	SIGNAL SECURITY (CLASSIC FOX)	4,010	7,024	7,789	2,687	Continuing	Continuing
X1236	SIGNAL SECURITY SYSTEM ENGR	645	951	881	1,509	Continuing	Continuing
X1237	TEMPEST T&D	382	1,180	893	817	Continuing	Continuing
X1419	SECURE VOICE INTEROPERABILITY SYSTEM	0	0	2,424	3,813	Continuing	Continuing

*Included in X0734 for FY 1981 and prior years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Secure Telemetry provides support for the integration of communications security modules into Navy weapons systems and TEMPEST support to the Navy test ranges. The Communications Security R&D Project supports studies, experiments and hardware developments to determine the technical, operational and fiscal implications of fulfilling Navy Communications Security requirements. CLASSIC FOX is aimed at developing equipment [

] and other signals exploitation susceptibilities. The Signal Security System Engineering project is intended to define and test feasible cost effective changes to be phased into major Signal Security System subsystems including near-term trade-offs, upgrade the Central Analysis Facility and develop specifications and advanced techniques for the future Navy Signal Security System. The TEMPEST project investigates the TEMPEST characteristics of operational and developmental Navy systems. The Secure Voice Interoperability system will develop hardware,

]

(U) BASIS FOR FY 1983 RDT&E REQUEST: The objective of this program element is to develop the techniques, equipments and systems necessary to protect Navy communications circuits from intercept, intelligence analysis and jamming. Continued effort is required to ensure that Department of Defense and Navy communications security and signals security objectives are met, that present threats can be identified and countered, and that future communications threats can be analyzed and countered effectively. An

Program Element: 33401N
DoD Mission Area: 364 - COMSEC

Title: Communications Security
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increase of 2,424 thousand in FY 1983 over FY 1982 to the Secure Voice Interoperability System results primarily from the initiation of hardware developments. An increase to Communications Security R&D of 758 thousand is due to tasks for Navy key distribution efforts. An increase of 765 thousand in the Signal Security CLASSIC FOX is due to extensive trade-off analysis studies, interoperability analysis and detailed technical specifications preparations. A decrease of 287 thousand in the TEMPEST R&D Project and a 70 thousand decrease in Signal Security System Engineering is due to program adjustments. 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: an increase of 969 in FY 1981 is due to inflation adjustments and Navy reprogramming to accelerate on-going efforts. A decrease of 329 is FY 1982 is due to inflation adjustment. An increase of 828 in FY 1983 is due to minor program adjustments and development and extensive analyses for CLASSIC FOX (X0746). The procurement plans for cryptographic equipment in FYs 1981-1983 have been adjusted by Navy and the National Security Agency.

(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	7,745	8,272	13,801	16,763	Continuing	Continuing
X0703	SECURE TELEMETRY	0*	0*	375	[illegible]	Continuing	Continuing
X0734	COMMUNICATIONS SECURITY R&D	1,865	2,855	4,134	8,571	Continuing	Continuing
X0735	CLARINET VALLOR	445	0	0	0	Complete	7,707
X0736	CLARINET PLATO	1,218	0	0	0	Complete	8,574
X0746	SIGNAL SECURITY (CLASSIC FOX)	3,391	4,248	7,129	5,201	Continuing	Continuing
X1236	SIGNAL SECURITY SYSTEM ENGR	260	735	963	1,024	Continuing	Continuing
X1237	TEMPEST R&D	566	434	1,210	1,058	Continuing	Continuing

*Included in X0734 for FY 1981 and prior years.

Program Element: 33401N
DoD Mission Area: 364 - COMSEC

Title: Communications Security
Budget Activity: 5 - Intelligence and Communication

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	50,900	57,600	88,700	126,300	Continuing	Continuing
Cryptographic Equipments	Various	Various	Various	Various	Various	Various

Program Element: 33401N
DoD Mission Area: 364 - COMSEC

Title: Communications Security
Budget Activity: 5 - Intelligence and Communication

(U) DETAILED BACKGROUND AND DESCRIPTION: The Communications Security program develops the means to utilize cryptographic equipments between ships, aircraft and shore installations. The current focus of this program is the extension of cryptographic protection to include all Navy voice and data communications which remain subject to enemy interception and intelligence analysis. A continuing part of this program is the modernization and improvement of current fleet capability in order to maintain existing security levels for teletype message communications. Work is being conducted under six projects. Two of these, Secure Voice Interoperability System and CLASSIC FOX are primarily directed toward development of new systems and equipment. Current hardware development efforts include the CLASSIC FOX system, Secure Voice Terminal Controlier, and the Automated Radio Wire Exchange. CLASSIC FOX is primarily directed toward the development of a new modular system in two configurations: a Tactical System for fleet use aboard ship and Land Mobile System[ ] CLASSIC FOX will support command and control countermeasures[ ]

(U) The Communications Security R&D project develops Communications Security technology and techniques for application on cryptographic equipments developed by the National Security Agency for all Navy platforms and missions. Current efforts in this project include investigations [ ] Additional efforts in this project provide support to ongoing National Security Agency Communications Security developments in order to ensure compatibility with Navy environmental and operational requirements. This support includes participation in Developmental Test and Evaluation and Operational Test and Evaluation, as well as participation in the Department of Defense Secure Voice Consortium. The Signal Security Engineering effort will provide the data necessary to assure that deployed Signal Security equipment and that which is in the process of being developed will operate in the future as reasonably efficient and capable systems which can be used to achieve Navy Signal Security objectives and goals in a timely manner. TEMPEST program develops techniques for detection, measurement, analysis and reduction of unintentional emanations. Develops criteria, standards, and specifications to minimize TEMPEST problems.

(U) RELATED ACTIVITIES: Cryptographic equipments developed by the National Security Agency under the TENLEY/SEELEY/KEESEE and Advanced Narrowband Digital Voice Terminal programs will be directly involved with the Navy Communications Security program. Additional equipments, techniques and/or technical advances resulting from the National Security Agency THORTON and Secure Voice Improvement programs will be applied to this development. The Communications Security R&D project develops advanced components and techniques for all future Communications Security developments. National Security Agency Program Element 33401G applies.

Program Element: 33401M
DoD Mission Area: 364 - COMSEC

Title: Communications Security
Budget Activity: 5 - Intelligence and Communication

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Electronic Systems Security Engineering Center, Washington, DC; Naval Ocean Systems Center, San Diego, CA. Prime Contractors: ITT, Nutley, NJ; TRW, Redondo Beach, CA; Atlantic Research Corporation, Alexandria, VA; GTE Sylvania, Mountain View, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Communications Security Control Group development was initiated in FY 1974 under projects CLARINET VALLOR and PLATO to provide a single system for voice and data Communications Security equipment installation, operation and maintenance. Full scale development of the Communications Security Control Group was concluded. CLARINET VALLOR and CLARINET PLATO were completed in FY 1980 Participation in the DoD Secure Voice Consortium continued. Development of very low data rate algorithms was initiated and a voice processor and audio input/output unit was developed. Variable data rate development continued with initiations of prototype development and test and system studies to define variable rate impact on switching, signalling and control functions. TEMPEST efforts included integration and test of an improved TEMPEST Analytical Support System, initiation of development for TEMPEST test Anti-Jam/Low Probability of Intercept systems, and initiation of a study to define TEMPEST test requirements resulting from underwater secure voice systems. Development of Communications Security capability for missile and aircraft telemetry systems was initiated with system definition of performance requirements and evaluation of candidate crypto units. Support to Communications Security and Anti-Jam/Low Probability of Intercept system developments continued with participation in Development Test and Evaluation of the Communications Security Control Group, KW-46 and KUYA systems. TEMPEST R&D included breadboard testing of TEMPEST test capability for Anti-Jam/Low Probability of Intercept systems and design of TEMPEST test techniques for underwater voice system. Continued Communications Security engineering support was provided to National Security Agency and Navy programs, such as VANDAL, KEESEE, KEMPLE, THORNTON and BANCROFT. The KG-84 was selected as the KW-7/KW26 replacement unit. The Secure Voice Interoperability System requirements investigations commenced. The CLASSIC FOX project was initiated in FY 1977, and included cost/performance tradeoff analyses and preparation of a system performance specification. The system definition was completed, design efforts were initiated and following review and acceptance of the contractor's system design, a feasibility demonstration model to validate the system concept and demonstrate system performance capabilities, and to validate the tactical concept was designed and fabricated. The Signal Security Engineering project commenced with a survey of existing hull-to-emitter correlation measurements.

2. (U) FY 1982 Program: The Very Low Data Rate Voice Processor algorithm development and evaluation contractor efforts will continue. A systems analysis of the future communications security key distribution requirements will be initiated. A low data rate voice processor to demonstrate terminal development will be initiated. The Secure Telemetry development will continue with Communications Security engineering support provided to test ranges and weapons instrumentation developments during Communications Security subsystem integration prior to technical and test and evaluation. TEMPEST developments for Phase Shift Keying, Low Probability of Intercept and Advanced NONSTOP instrumentation will continue. The TAILSPIN (Radio Frequency Simulation) test system development will continue. The KW-7 replacement program will define the necessary interface and control parameters

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required for shipboard installation and use of the KG-84. A development of a KG-84 shipboard adapter unit will start. The development of noise cancelling techniques will continue. The CLASSIC FOX project will complete the Feasibility Demonstration Model and at-sea tests. The Land Mobile System (CLASSIC COYOTE) systems engineering will continue. The Signal Security Systems Engineering project will analyze major operational gaps in the Navy's Signal Security System to determine areas where near-term engineering improvements could make the greatest profit and synthesis of the required structure of an overall Signal Security System will begin. The Secure Voice Interoperability requirements investigations will be completed and the Secure Voice Terminal Controller specification prepared.

3. (U) FY 1983 Planned Program: The Communications Security Control Group hardware will be used to validate Navy key distribution concepts. Test and evaluation of Communications Security modifications as well as support to the National Security Agency KUTA program. Laboratory testing of the Very Low Data Rate Voice Processor will be performed and the investigation of algorithms using data rates below 600 bits per second will continue. Operational demonstration of a low data rate voice terminal will be conducted. Support to the DoD Secure Voice Consortium will continue with voice quality testing, algorithm simulation/analysis and performance analysis. Support to the National Security Agency for the Advanced Narrowband Digital Voice Terminal Communications Security module development will continue. Development of hardware for the Secure Voice Interoperability System will commence. Development of an improved test system for automatic testing of Communications Security equipment will be initiated. The KG-84 shipboard adapter unit will undergo test and evaluation. Initiate an analysis of the use of office automation and word processing systems to identify the unique security problems imposed upon these systems and their users by classified information processing. Under the TEMPEST effort, development of advanced NONSTOP Instrumentation and TAILSPIN test system will continue. Expansion of Navy Automated TEMPEST to address the multiparameter analysis problem will continue. Development of the Data Collection and Storage System will be completed. Development which addresses TEMPEST hazards identified for optical and acoustical systems will be initiated. CLASSIC FOX Feasibility Demonstration Model at-sea tests and analysis of results will be utilized in design and contract specification for the Tactical Afloat Validation Model. Extensive tradeoff analysis of interfaces to other systems, Integrated Logistic Support studies, interoperability and detailed technical specifications preparation will commence. Fabrication and integration of the land mobile system will continue. The Signal Security System Engineering project will continue system analysis, system definition, and hull-to-emitter correlation measurement survey. Short term improvements identified in FY 1981 will be tested and Signal Security System definition will continue.

4. (U) FY 1984 Planned Program: Complete laboratory testing of the Very Low Data Rate Voice Processor and prepare development specifications. Initiate advanced development of the Low Data Rate Voice Terminal . Secure Telemetry Project (X0703) will continue modifications to missile and aircraft telemetry. Continue support to the National Security Agency KUTA program. Continue support to the DoD Secure Voice Consortium voice quality and intelligibility testing. Continue TEMPEST developments of the NONSTOP and TAILSPIN test systems. Continue development of the Secure Voice Interoperability System. Provide support to the National Security Agency development of the Advanced Narrowband Digital Voice Terminal Communications Security module. Continue development of improved Communications Security test system. Continue development of a Navy Key Distribution System. Initiate efforts

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in network security techniques. Design will be completed on the CLASSIC FOX Tactical Afloat Validation Model and fabrication, integration and testing of a service test model will begin. Complete security for word processing system analysis; determine requirements for future developments.

5. (U) Program to Completion: This is a continuing program. Service testing of the CLASSIC COYOTE land mobile system will be completed in preparation for approval for service use in FY 1984. Planned completion of the CLASSIC COYOTE and CLASSIC FOX systems leading to procurement of the land mobile variant (FY 1985 and out) and the tactical afloat variant (FY 1987 and out).

6. (U) Milestones: Not applicable.

Project Number: X0746
Program Element: 33401N
DoD Mission Area: 364-COMSEC

Title: Signal Security (CLASSIC FOX)
Title: Communications Security
Budget Activity: 5-Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION:

CLASSIC FOX, the Signal Security Assessment System, will develop systems to monitor and evaluate U.S. Navy signals. These include operational as well as new signals being developed. The system is intended for both shore and fleet applications. Signal security areas include:

2) assess susceptibilities and enhance security of new electronic systems prior to and during RDT&E;

5) produce emission management data in a format suitable for input to command and control systems;

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA: Naval Electronic Systems Security Engineering Center, Washington, DC. Contractor: GTE Sylvania, Mountain View, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The CLASSIC FOX project was initiated in FY 1977, and included cost/performance trade-off analyses and preparation of a summary performance specification. The system definition was completed, design efforts were initiated and, following review and acceptance of the contractor's system design, a feasibility demonstration model to validate the system concept, demonstrate system performance capabilities and validate the tactical concept was designed and fabricated.

Project Number: X0746
Program Element: 33401N
DoD Mission Area: 364-COMSEC

Title: Signal Security (CLASSIC FOX)
Title: Communications Security
Budget Activity: 5-Intelligence and Communications

2. (U) FY 1982 Program: The CLASSIC FOX project will complete shipboard feasibility demonstration model at-sea tests. System engineering for the land mobile System (CLASSIC COYOTE) will continue. Updated requirements and revised operational concept are the basis for contract award for land mobile system and subsystem specifications for hardware, software, and full scale development beginning in FY 1982.

3. (U) FY 1983 Planned Program: CLASSIC FOX feasibility demonstration model at-sea tests and analysis of results will be utilized in design and contract specification for the tactical afloat validation model. Extensive tradeoff analysis studies of interfaces to other system, Integrated Logistic Support studies, interoperability analysis and detailed technical specifications preparation will be performed. Fabrication and integration of the land mobile system will continue.

4. (U) FY 1984 Planned Program: Design will be completed on the CLASSIC FOX tactical afloat validation model and fabrication, integration and testing of a service test model will begin.

5. (U) Program to Completion: Service testing of the CLASSIC COYOTE land mobile system will be completed in preparation for approval for service use in FY 1984. Planned completion of the CLASSIC FOX and CLASSIC COYOTE systems leading to procurement of the land mobile variant (FY 1985 and out) and the tactical afloat variant (FY 1987 and out).

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
X0746	Signal Security (CLASSIC FOX)	4,010	7,024	7,789	2,687	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 34111N
Title: Special Activities
DoD Mission Area: 313 - Classified Programs
Budget Activity: 5 - Intelligence and Communications

(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	82,606	101,690	120,380	180,176	Continuing	Continuing
T0139	Special Activities	82,606	101,690	120,380	180,176	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: Details of this program are of a higher classification and of limited access nature. 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: Details of this program are of a higher classification.

(U) OTHER APPROPRIATION FUNDS: Details of this program are of higher classification.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 63518N
Title: Advanced Navigation Development
DoD Mission Area: 361 - Navigation and Position Fixing
Budget Activity: 5 - Intelligence and Communications

(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	1,608	2,142	476	476	Continuing	Continuing
S0254	CV Navigation System (MINI SINS)	1,608	2,142	476	-	0	9,297
S1418	Sub Navigation System Advanced	-	-	-	476	Continuing	Continuing
	Quantity:						
	CV Navigation System (Development Test and Evaluation/Operational Test and Evaluation)						(1)
	Sub Nav Sys (Development Test and Evaluation)						(1)

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program pursues navigation system developments aimed at providing improved shipboard self-contained capabilities for the determination of own ship position, heading and velocity for alignment of carrier-based aircraft inertial platforms and for submarines.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue the development of the CV Navigation System for Test and Evaluation leading to Approval for Service Use. 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 +1,282 (Project S0254) is to cover increased program costs necessitated by inability to meet performance requirements using original lower-cost approach; a decrease in FY 1982 of 30 (Project S0254) as the result of a budgetary adjustment. A decrease in FY 1983 of 540 (-508 and -32 for Projects S1418 and S0254 respectively) as the result of a slippage in the start (FY 1984) of Project S1418 and a budgetary adjustment in Project S0254.

Program Element: 63518N
DoD Mission Area: 361 - Navigation and Position Fixing

Title: Advanced Navigation Development
Budget Activity: 5 - Intelligence and Communications

(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	337	326	2,172	1,016	1,019	9,604
S0254	CV NAV SYSTEM	337	326	2,127	508	0	8,077
31418	SUB NAVIGATION SYSTEM	-	-	-	508	1,019	1,527

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0254 CV NAVIGATION SYSTEM						
OPN	-	-	-	-	32,096	32,096
FMP	-	-	-	-	4,200	4,200
Quantity					(15)	(14)
S1418 SUB NAVIGATION SYSTEM	-	-	-	-	-	-

Program Element: 63518N
DoD Mission Area: 361 - Navigation and Position Fixing

Title: Advanced Navigation Development
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: This program involves two navigation system developments. (1) S0254, Carrier Navigation System, a highly reliable shipboard self-contained capability to align aircraft inertial navigation systems. The Carrier Navigation System will consist of a dual inertial navigation system (AN/WSN-1(V)2), two AN/UYK-20 computers and peripherals which will provide continuous alignment data to aircraft inertial systems. The system will also provide data for the Automatic Carrier Landing System radar, Naval Tactical Data System, ship control and navigation. This program provides for the development of software and the procurement of one service test model to support Technical and Operational Evaluations. (2) S1418, Submarine Navigation System Development, will provide a precision, self-contained inertial navigation system using ring laser gyro technology. This advanced system will provide performance, cost, reliability and maintainability advantages over current systems.

RELATED ACTIVITIES: As the result of a competitive award, the CV Navigation System will use the AN/WSN-1(V)2 Dual Inertial Navigation System, which is installed in SSN 688 Class submarines and under procurement for an SSN 594 Class submarine backfit program.

(U) WORK PERFORMED BY: In-House: Naval Sea Systems Command, Washington, D.C.; Naval Air Development Center (lead laboratory), Warminster, PA. Contractor: S0254 - Rockwell International, Anaheim, CA. S-1418 - To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: CV Navigation System - The software development contract was awarded on 30 June 1980. Software development efforts were initiated.

2. (U) FY 1982 Program: CV Navigation System - Complete software development and certification. Deliver system to designated carrier.

3. (U) FY 1983 Planned Program: CV Navigation System - Install system aboard designated carrier. Conduct Technical Evaluation and initiate Operational Evaluation.

4. (U) FY 1984 Planned Program: CV Navigation System - Complete Operational Evaluation. Obtain Approval for Service Use. Submarine Navigation Systems: Initiate advanced development design.

5. (U) Program to Completion: Submarine Navigation System Development. Design and fabricate advanced development model inertial navigator. Conduct Development Test and Evaluation. Transition to Engineering Development.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64514N
Title: Navigation Systems
DoD Mission Area: 361 Navigation and Position Fixing
Budget Activity: 5 - Intelligence and Communications

(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	5,210	5,649	3,820	1,487	1,888	56,632
S0247	Electrically Suspended Gyro Navigator	4,449	4,257	2,849	1,208	1,604	49,219 3/
	(Quantity Electrically Suspended Gyro Navigator - Engineering Development Models) 1/2/						(2)1/2/
S0253	Doppler Log	761	1,392	971	279	284	7,413 4/
	(Quantity Doppler Log - Engineering Development Model)		(4)1/				(4) 1/

1/ Development/Operational Test and Evaluation
2/ Procured prior to FY 1981
3/ Includes $17,308 thousand prior to FY 1977 in Program Element 63518N.
4/ Includes $700 thousand in FY 1978 in Program Element 63518N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides for the development of improved self-contained navigation capabilities (own ship position, attitude, and velocity), primarily for attack submarines, with the potential for application to surface ships.

(U) BASIS FOR FY 1983 RDT&E REQUEST: S0247 Electrically Suspended Gyro Navigator: Conduct Follow-On Test and Evaluation of the Electrically Suspended Gyro Navigator system and inertial components. Complete design and evaluation of the stand-alone firmware controller to allow operation of Electrically Suspended Gyro Navigator independent of central computer complex. Decreased funding in FY 1983 is due to prior completion of major contractual efforts. S0253 Doppler Log: Complete qualification testing at contractor site and technical evaluation of Doppler Log aboard attack submarine. Decreased funding in FY 1983 due to prior completion of major contractural efforts. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated.

Program Element: 64514N
Title: Navigation Systems
DoD Mission Area: 361 Navigation and Position Fixing
Budget Activity: 5 - Intelligence and Communications

(U) COMPARISON WITH THE FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the (amended) FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: RDT&E - (1) Project S1445 (Dual) Miniature Ships Inertial Navigation System Improvement) shown in the FY 1982 Descriptive Summary as a planned FY 1982 start, has been deleted. (2) The FY 1981 funding has decreased by 5 as a result of below-threshold reprogrammings to accelerate development of the Electrically Suspended Gyro Navigator Stand-Alone processing capability (+1,197 in project S0247) and a partial offset for the above reprogramming (-1,202 from Project S0253) which resulted in schedule stretch-out in the Doppler Log program. (3) The FY 1982 program element total estimate has decreased by 1,995 due to cancellation of the Dual Miniature Ships Inertial Navigation System Improvement Program (Project S1445) (shown as a FY 1982 new start in the FY 1982 Descriptive Summary) (-1,004) and restructuring of projects S0247 and S0253 -992 and -571 espectively). (4) The FY 1983 program year and the total costs of projects S0247 and S0253 and the program element have been estimated as shown. Shipbuilding and Conversion, Navy - (1) The FY 1981 funding has been increased by 6,991 due to procurement of two electrically Suspended Gyro Navigators not shown in the FY 1982 Descriptive Summary. (2) The FY 1982 estimate has increased by 930 due to revised cost estimates. Other Procurement, Navy - (1) The FY 1981 funding has been reduced by 659 due to revised inflation factors. (2) the FY 1982 estimate has been revised, resulting in a change of -1,990 for Electrically suspended Gyro Navigators procurement. (3) the FY 1983 estimate for Electrically Suspended Gyro Navigator procurement has decreased by 13,213 due to deletion of 8 of the 13 units shown in the FY 1982 Descriptive Summary. (4) The total number of units in the Electrically Suspended Gyro Navigator procurement program has been corrected, resulting in an apparent change of two units due to an error in the FY 1982 Descriptive Summary.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6,053	5,215	7,644	TBD	TBD	TBD
S0247	Electrically Suspended Gyro Navigator	5,277	3,252	5,249	TBD	TBD	TBD
	(Quantity - Electrically Suspended Gyro Navigator Engineering Development Models)						TBD
S0253	Doppler Log	776	1,963	1,391	TBD	TBD	TBD
	(Quantity - Doppler Log Engineering Development Models)						TBD
S1455	Dual Miniature Ship's Inertial Navigation System Improvement	-	-	1,004	TBD	TBD	TBD
	(Quantity - Dual Miniature Ship's Inertial Navigation System Improvement - Engineering Development Model)		2/				TBD

Notes: 1/ Development/Operational Test and Evaluation

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Program Element: 64514N
DoD Mission Area: 361 Navigation and Position Fixing

Title: Navigation Systems
Budget Activity: 5 - Intelligence and Communications

(U) OTHER APPROPRIATION FUNDS

	Total FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Estimated Cost
Shipbuilding and Conversion, Navy	6,991	7,612	8,222	13,098	*	*
Quantity (Electrically Suspended Gyro Navigator)	(2)	(2)	(2)	(3)	*	*
Other Procurement, Navy						
Electrically Suspended Gyro Navigator	10,137	14,575	16,974	24,839	60,464	134,089
Quantity (Electrically Suspended Gyro Navigator)	(4)	(9)	(5)	(12)	(37)	(69)
Doppler Log	-	-	-	-	14,073	14,073
Quantity (Doppler Log)	(-)	(-)	(-)	(-)	(106)	(106)

* These estimates depend on future attack submarine construction authorizations.

Program Element: 64514N
DoD Mission Area: 361-Navigation and Position Fixing

Title: Navigation Systems
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: This Program Element provides for the development of improved shipboard self-contained capabilities for the determination of own ship position, attitude, and velocity. There are two projects in the element: (a) S0247, Electrically Suspended Gyro Navigator - This development is responsive to the need for a passive, continuous, worldwide, all weather navigation system not subject to jamming, destruction or intentional shutdown to deny enemy usage of the system. The Electrically Suspended Gyro Navigator is an inertial system for the SSN 637, 688 and future attack submarines and will provide precise inertial position without the need for frequent reference to external fix information. The system is being developed to replace shipboard inertial navigators presently installed in attack submarines of the SSN 637 class, SSNs 688-699 and new installations. Resets will only be required approximately once every two weeks as compared to the current average interval of not less often than every few days. Two Engineering Development Models have been procured to support Operational Test and Evaluation requirements. An additional effort under this program is the incorporation of a stand-alone data processing capability in the Electrically Suspended Gyro Navigator control console which will allow system operation independent of the attack submarine Central Computer Complex. This will result in improved navigation system availability and free the computer complex for use by the fire control system in support of the Over-the-Horizon targeting capability which requires increased computer resources. (b) S0253, Doppler Log - The Doppler Sonar Velocity Log is intended to replace current ships' Electromagnetic Logs which are used for determining ship's speed relative to the water. The doppler sonar concept will provide a greater accuracy and will require significantly less frequent calibration than the electromagnetic log. Primary need for the Doppler Sonar Velocity Log will be aboard all SSN 594 class and later attack submarines where it will facilitate accurate passive fire control solutions and provide damping information for inertial navigation and gyrocompass (heading) systems. Four engineering development models will be procured to support shipboard Technical Evaluation and Operational Evaluation, environmental and qualification testing and long-term reliability and maintainability testing.

(U) RELATED ACTIVITIES: The Air Force Gimbaled Electrostatic Airborne Navigation System and Standard Precision Navigator System hardware was modified for shipboard operation used in Navy development by Project S0247, Electrically Suspended Gyro Navigator. Navy Strategic Systems Project Office systems work under Program Element 11228N, Project B0003, TRIDENT Missile System using Electrically Suspended Gyro technology was monitored to avoid duplication. The stand-alone processing effort is required so that the MK-117 Fire Control System (Program Element 64562N, Project S0236) can accommodate an Over-the-Horizon Targeting Capability as required for submarine deployment of the TOMAHAWK Cruise Missile (Program Element 64367N, Project X0545). The Electrically Suspended Gyro Navigator has been identified as part of the navigation subsystem of the submarine Advanced Combat system (Program Element 64524N, Project S1347. Project S0253, Doppler Log: Work under Exploratory Development Program, Program Element 62721N, Command and Control Technology provided basis for the intended Doppler Sonar Velocity Log development.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, (Lead Laboratory), Warminster, PA. Contractors: Electrically Suspended Gyro Navigator - Rockwell International (Autonetics Group), Anaheim, CA. Contractor for Doppler Log - Sperry Marine Systems, Charlottesville, VA.

Program Element: 64514N
Title: Navigation Systems
DoD Mission Area: 361-Navigation and Position Fixing
Budget Activity: 5 - Intelligence and Communications

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: S0247, Electrically Suspended Gyro Navigator - Advanced development model contract awarded in 1972. Laboratory and at-sea test and evaluation showed feasibility of meeting Navy objectives. Competitive approaches established for engineering development models. Engineering development authorized. Contract for engineering development models (2) let to Rockwell International in June 1975 on competitive basis. Completed design and fabrication of Electrically Suspended Gyro Navigator systems together with software package applicable to technical and operational evaluation. Completed environmental testing. Contracted for operational and casualty computer program applicable to operational Electrically Suspended Gyro Navigators. Completed technical and operational evaluations aboard USS RICHARD B. RUSSELL (SSN 687). Provisional Approval for Service Use granted in August 1980. Initiated production in September 1980. Certified navigation operational/casualty software program. Initiated design and fabrication of modified Electrically Suspended Gyro Navigator printed circuit boards to incorporate firmware embedded processor functions. S0253, Doppler Log - Concept established via exploratory development completed in FY 1974. This was a new start in FY 1978 under Program Element 63518N (Advanced Navigation Development). Contract for engineering development models awarded and design initiated in FY 1981.

2. (U) FY 1982 Program: S0247, Electrically Suspended Gyro Navigator - Continue complete integration of navigation software with attack submarine operational composite software program. Continue follow-on test and evaluation. Complete design and initiate evaluation of stand-alone firmware processor related modifications to Electrically Suspended Gyro Navigator control console. S0253, Doppler Log - Complete hardware design and fabrication of engineering development models. Initiate accuracy and environmental tests. Initiate installation planning for technical and operational evaluation testing.

3. (U) FY 1983 Planned Program: S0247, Electrically Suspended Gyro Navigator - Certify integrated attack submarine operational software package at a land-based test site. Continue follow-on test and evaluation. Conduct test and evaluation of stand-alone processor modification. S0253, Doppler Log - Complete installation on attack submarine. Complete technical evaluation. Transition to operational evaluation. Complete qualification/environmental testing.

4. (U) FY 1984 Planned Program: S0247, Electrically Suspended Gyro Navigator - continue follow-on test and evaluation. Conduct test and evaluation of Electrically Suspended Gyro Navigator operating with the Fire Control/Central Computer complex aboard first operational installation. Complete test and evaluation of stand-alone processor modification. S0253, Doppler Log - Complete operational test and evaluation.

5. (U) Program to Completion: S0247, Electrically Suspended Gyro Navigator - Obtain full approval for service use. Conduct follow-on test and evaluation as required. S0253, Doppler Log - Conduct follow-on test and evaluation as required; achieve approval for service use.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

(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	*	*	43,826	61,749	146,630	305,418
X0728	Extremely High Frequency Satellite Communications System	(1,845)	(34,198)	19,896	23,871	90,230	170,040
X1660	Navy Extremely High Frequency Space Segment	0	**	23,930	37,278	56,400	135,378

* FY 1981 and FY 1982 funds provided under Program Elements 33109N (Satellite Communications).
** FY 1982 funds provided under Program Element 11403N (HYDRUS) but not identified as a separate project.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops the Extremely High Frequency satellite communications system which includes space packages (Project X1660), and associated terminals, control facilities/services, interconnect and technical facilities as designated (Project X0728). The overall system meets a fleet requirement for providing reliable, wartime covert, jam-resistant communications under projected threat environments.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue full scale development of the Navy Extremely High Frequency Satellite Communication System. Increase in funding in terminal project in FY 1985 is for the design and fabrication of 12 service test model terminals comprising the full scale development. Continue development of two flight packages and a ground qualification unit. The above funding profile includes outyear escalation and encompasses all work and development phases now planned or anticipated through FY 1988.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: The changes between the funding profile shown in the FY 1982 Descriptive Summary (Program Element 33109N) and this Descriptive Summary reflect the segregation of Extremely High Frequency efforts under a unique Program Element (64577N). The funding increase of 24,291 in Project X0728 in FY 1982 is due to addition of 24,500 by Congress for an acceleration of the terminal development effort adjusted (-209) downward for reduced inflation. The funds in Project X1660 in FY 1982 and beyond are to develop, acquire, integrate and launch an Extremely High Frequency transition package on a host satellite. Both increases reflect long-lead time purchases and the commencement of terminal and space processor package assembly.

Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY (Partial PE 33109N):

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	16,983	5,078	12,620	24,464	65,288	327,019
X0728	Extremely High Frequency Satellite Communications System	5,138	1,999	9,907	22,708	63,675	107,562
	Other	11,845	3,079	2,713	1,756	1,613	219,517

(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	0	0	0	0	931,424	931,424
(Quantity)	(0)	(0)	(0)	(0)	(376)	(376)
WPN	0	0	0	0	1,091,780	1,091,780

Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: The Extremely High Frequency Satellite Communications, Project X0728, and the Extremely High Frequency Space Segment, Project X1660, are intended to satisfy the fleet-validated requirement for rapid, secure and reliable wartime communications. The objective of the Navy's terminal development effort is to develop, acquire, and field widely-deployable terminals that provide jam resistance and submarine covert satellite communications against threats projected through the year 2000. Current development efforts are an outgrowth of advanced developments that culminated with the operational tests of a submarine terminal through the Extremely High Frequency Lincoln Experimental Satellites 8 and 9, and shipboard AN/WSC-7 terminals through the Defense Satellite Communications System Satellites. Based on these results and the acknowledged need to field a wartime satellite communications system, the Chief of Naval Operations in October 1979, formally directed combined development of the Extremely High Frequency terminals for both submarines and surface ships. As structured, the program is divided into three phases. The first phase consists of two parts: System Definition (1A) and Concept Validation (1B). Phase 1A was completed in April 1980, and Phase 1B concluded in late September 1981. The second phase is Full Scale Development and service testing leading to service approval. The third phase is production and fleet implementation. Prime Navy terminal contractors for Phase I are Rockwell, Harris, and Raytheon. Based on competitive procedures, two of the above contractors will be selected to continue work during Phase II Full Scale Development. During Phase II, each contractor will be tasked to build and deliver six service test models for a competitive evaluation on fleet units and at shore sites. Ultimately one of the original three contractors will be selected to produce the Navy Extremely High Frequency satellite communications terminal to meet a scheduled initial operational capability in FY 1991. At present, 376 terminals are projected, although some aircraft terminal employment is eventually planned. Design-to-cost objectives in FY 1979 dollars (in thousands) are: surface ships 800/terminal; submarine 900/terminal; shore 1000/terminal; and aircraft (P-3 or equivalent) 900/terminal on new airframes. The objective of the Navy's satellite package development effort is to develop, acquire, integrate and launch a spacecraft processor package onboard a satellite host of opportunity to: (1) demonstrate the operational capabilities of Extremely High Frequency Engineering Development Model terminals; and (2) to provide a residual Extremely High Frequency space segment asset for Fleet operational use during the mid-1980's. The Secretary of the Navy, in July 1981, formally directed that planning for Extremely High Frequency initial spacecraft processor package development and deployment commence. As structured, the program is concurrent in schedule to the terminal development effort. Specification of the package will be complete in the first quarter of FY 1982, with development commencing in early FY 1982. Two flight packages and a ground qualification processor package will be developed. The flight processor packages will subsequently be integrated into hosts of opportunity (FLTSAT, etc.) and launched in the FY 1986 timeframe to support terminal test and evaluation.

(U) RELATED ACTIVITIES: The Extremely High Frequency spacecraft package development will be coordinated with the Air Force. The Navy terminals developed under this program are designed to operate with the Extremely High Frequency packages of the Air Force Military Strategic Tactical and Relay (MILSTAR) System. Concurrently, the Army is exploring the applicability of Extremely High Frequency satellite communications and is formulating and Extremely High Frequency Single Channel Objective Tactical Terminal Program for ground force use. The Defense Communications Agency is responsbile for consolidating satellite communications

Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

requirements and addressing future Satellite Communications planning. Internal to Navy, the Navy Extremely High Frequency terminal project develops and fields spacecraft processor package compatible terminals.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT; Naval Air Development Center, Warminister, PA; Navy Postgraduate Shcool, Monterey, CA; Naval Security Group, Washington, DC; an Naval Intelligence Support Center, Washington, DC. Contractors: Harris, Melbourne, FL; Raytheon, Sudbury, MA; Rockwell International, Newport Beach, CA; Lincoln Laboratory, Lexington, MA; TRW, Redondo Beach, CA; and Hughes, Los Angeles, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Confirmed the concept that communications in the Extremely High Frequency band using a satellite was feasible as a result of the CLARINET OMEN/Lincoln Laboratory Experimental Satellite and AN/WSC-7 developments. Subsequent Chief of Naval Operations action directed the concept be extended to all Navy mobile platforms and led to the formulation of the present terminal program. System Definition and Concept validation have been completed for the terminal. Effort commenced to ensure compatibility between terminals and the design of the space package, with Lincoln Laboratory providing initial spacecraft processor package specifications.

2. (U) FY 1982 Program: Two of the three concept validation contractors will be selected to begin building six each full scale development terminals. Terminal Full Scale Development commences second quarter FY 1982 after Navy Systems Acquisition Review Council II Decision. Laboratories and support activities will assist in monitoring contractors' design of equipment and testing. Laboratories and/or industrial contractors will be selected to begin building processor packages. Monitoring of contractor efforts by Navy laboratories will continue into host spacecraft integration. Funding increase is due to Congressional action to commence package development and ensure purchase of long-lead parts.

3. (U) FY 1983 Planned Program: Continue full scale development of 12 Extremely High Frequency terminals. Build two flight packages and a ground qualification model. Planned hosts are FLTSAT 7 and 8. Increased funding levels over FY 1983 are due to maturing of the full scale development effort encompassing the delivery of parts and terminal assembly. Funding transition from Program Element 33109N to Program Element 64577N to allow aggregation of Extremely High Frequency funding.

4. (U) FY 1984 Planned Program: Continue Full Scale Development of terminals. Continue development of processor packages. Laboratory monitoring continues for the terminals and processor packages.

Program Element: 64577N
DoD Mission Area: 963 - Common User Communications

Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

5. (U) Program to Completion: Continue terminal full scale development to completion in FY 1985, test and evaluation in FY 1985-FY 1986, approval for service use in FY 1986-FY 1987, initial system operating capability FY 1987, with full operational capability projected for FY 1991. Integrate an Extremely High Frequency antenna into Type 8 Mod 3 periscopes for use on SSBN's; completes FY 1984/FY 1985. Spaceborne processor package operational by FY 1986 timeframe. Extremely High Frequency aircraft terminal and SSN non-penetrating mast developments commence in FY 1984. The purpose of these latter two efforts is extended ongoing terminal development work to satisfy Navy aircraft requirements and SSN-unique constraints with respect to Extremely High Frequency antenna placement. Initiate terminal production FY 1988. Extremely High Frequency processor package development continues with integration into host spacecraft projected for FY 1985, with launches of host vehicles scheduled for FY 1986. Spaceborne packages will be used to test and evaluate the full scale development terminals, and to provide Extremely High Frequency operational capability into the early 1990's until the Air Force Military Strategic Tactical and Relay System is operational.

6. (U) Milestones:

Milestones	Fiscal Year
1. System Definition/Concept Development Completion for Terminals	1st QTR/82
2. Navy System Acquisition Review Council II for Terminals	2nd QTR/82
3. EHF Processor Package Specifications Completed	1st QTR/82
4. Award Terminal FSD	2nd QTR/82
5. Processor Package Contract Award	2nd QTR/82
6. Commence Long-Lead Fully Operational Spacecraft	1st QTR/85
7. Co tion of Terminal Full Scale Development	3rd QTR/85
8. Pac ge Integration	2nd-4th QTR/85
9. Space Package Launch	1st-3rd QTR/86
10. Operational Status	3rd-4th QTR/86
11. Approval for Service Use for Terminal	1st QTR/87
12. Navy System Acquisition Review Council III for Terminals	1st QTR/87
13. Launch Fully Operational Spacecraft	2nd QTR/91

Project: X0728 Title: Navy Extremely High Frequency Satellite Communications System
Project Element: 64577N Title: Extremely High Frequency Satellite Communications
DoD Mission Area: 363 - Common User Communications Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: The Extremely High Frequency Satellite Communications Project satisfies a fleet validated requirement for rapid, secure and reliable wartime communications. The objective of the Navy's terminal development effort is to develop, acquire, and field widely-deployable terminals that provide platform jam resistance and submarine covert satellite communications against threats projected through the year 2000. Current development efforts are an outgrowth of advanced developments that culminated with the operational tests of a submarine terminal through the Extremely High Frequency Lincoln Experimental Satellites 8 and 9, and shipboard AN/WSC-7 terminals through the Defense Satellite Communications System Satellite. Based on these results and the acknowledged need to field a wartime satellite communications system, the Chief of Naval Operations in October 1979, formally directed combined development of the Extremely High Frequency terminals for both submarines and surface ships. As structured, the program is divided into three phases. The first phase consists of two parts: Systems Definition (1A) and Concept Validation (1B). Phase 1A was completed in April 1980, and Phase 1B concluded in late September 1981. The second phase is Full Scale Development and service testing leading to service approval. The third phase is production and fleet implementation. Prime Navy terminal contractors for Phase I are Rockwell, Harris, and Raytheon. Based on competitive procedures, two of the above contractors will be selected to continue work during Phase II Full Scale Development. During Phase II, each contractor will be tasked to build and deliver six service test models for a competitive evaluation on fleet units and at shore sites. Ultimately one of the original three contractors will be selected to produce the Navy Extremely High Frequency satellite communications terminal to meet a scheduled initial operational capability in FY 1991. At present, 376 terminals are projected, although aircraft terminal employment could raise the final quantity. Design-to-cost objectives in FY 1979 dollars (in thousands) are: surface ships 800/terminal; submarine 900/terminal; shore 1000/terminal; and aircraft (P-3 or equivalent) 800/terminal.

(U) RELATED ACTIVITIES: The Navy will coordinate with the Air Force in the development and acquisition of terminal-compatible Extremely High Frequency space processor packages that will be deployed on FLTSAT 7 and 8. In addition, the Navy terminals developed under this program are designed to operate with the Extremely High Frequency packages of the Air Force Military Strategic and Tactical Relay System. Concurrently, the Army is exploring the applicability of Extremely High Frequency satellite communications and is formulating an Extremely High Frequency Single Channel Objective Tactical Terminal Program for ground force use. The Defense Communications Agency is responsible for consolidating satellite communications requirements and addressing future Satellite Communications planning.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT; Naval Air Development Center, Warminster, PA; and Navy Postgraduate School, Monterey, CA; Naval Security Group, Washington, DC; and Naval Intelligence Support Center, Washington, DC. Contractors: Harris, Melbourne, FL; Raytheon, Sudbury, MA; Rockwell International, Newport Beach, CA; and Lincoln Laboratory, Lexington, MA.

Project: X0728 Title: Navy Extremely High Frequency Satellite Communications System
Project Element: 64577N Title: Extremely High Frequency Satellite Communications
DoD Mission Area: 363 - Common User Communications Budget Activity: 5 - Intelligence and Communications

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The concept that communications could be done in the Extremely High Frequency band with a satellite was confirmed by the results of the CLARINET OMEN/Lincoln Laboratory Experimental Satellite and AN/WSC-7 developments. Subsequent Chief of Naval Operations action directed the concept be extended to all Navy mobil platforms and led to the formulation of the present program. System Definition and Concept Validation have been completed for Phase I. Additional funding support for this project was provided from Program Element 11403N in FY 1981.

2. (U) FY 1982 Program: Select two of the three concept validation contractors to begin building six each full scale development terminals. Terminal full scale development starts second quarter FY 1962 after Navy System Acquisition Review Council II Decision. Laboratories and support activities will assist in monitoring contractors' design of equipment and testing.

3. (U) FY 1983 Planned Program: Full scale development of 12 Extremely High Frequency terminals continues at the two contractors' plants. Monitoring of contractor effort continues at Navy laboratories. Increased funding levels over FY 1982 is due to the maturing of the full scale development effort encompassing the delivery of parts and terminal assembly. Funding transition from Program Element 33109N to Program Element 64577N is to allow aggregation of Extremely High Frequency funding.

4. (U) FY 1984 Planned Program: Continue full scale development of 12 terminals. Laboratory monitoring continues.

5. (U) Program to Completion: Continue terminal full scale development to completion in FY 1985, test and evaluation in FY 1985/FY 1986, approval for service use FY 1986/FY 1987, initial system operating capability FY 1987, with full operational capability projected for FY 1991. Integration of an Extremely High Frequency antenna into Type 8 Mod 3 periscopes for use on SSBN's completed FY 1984/FY 1985. Spaceborne processor package operational by FY 1986 timeframe. Extremely High Frequency aircraft terminal and SSN non-penetrating mast developments commence in FY 1984. The purpose of these latter two efforts is extended ongoing terminal development work to satisfy Navy aircraft requirements and SSN-unique constraints with respect to Extremely High Frequency antenna placement. Initiate terminal production FY 1988.

Project: X0728 Title: Navy Extremely High Frequency Satellite Communications System
Project Element: 64577N Title: Extremely High Frequency Satellite Communications
DoD Mission Area: 363 - Common User Communications Budget Activity: 5 - Intelligence and Communications

6. (U) Milestones:

Milestone	Fiscal Year
1. System Definition/Concept Development Completion	1st QTR/82
2. Navy Systems Acquisition Review Council II	2nd QTR/82
3. Award Terminal Full Scale Development	2nd QTR/82
4. Completion of Terminal Full Scale Deveopment	3rd QTR/85
5. Approval for Service Use	1st QTR/87
6. Navy Systems Acquisition Review Council III	1st QTR/87

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimated	FY 1983 Estimated	FY 1984 Estimated	Additional to Completion	Total Estimated Cost
X0728	Extremely High Frequency Satellite Communications System	(1,845)*	(34,198)**	19,896	23,871	90,230	170,040

* FY 1981 funding for this project was under Program Element 33109N.
**FY 1982 funding for this project is under Program Element 33109N.

Project: X1660 Title: Navy Extremely High Frequency Space Segment
Program Element: 64577N Title: Extremely High Frequency Satellite Communications
DoD Mission Area: 363 - Common User Communications Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: The Extremely High Frequency Space Segment Project represents the spaceborne portion of the Navy Extremely High Frequency Satellite Communications System. The overall terminal/satellite system satisfies a fleet-validated requirement for rapid, secure and reliable wartime communications. The objective of the Navy's satellite package development effort is to develop, acquire, integrate and launch a spacecraft processor package onboard a host of opportunity to: (1) demonstrate the operational capabilities of Extremely High Frequency Engineering Development Model terminals, and (2) to provide a residual Extremely High Frequency space segment asset for Fleet operational use during the mid-1980's. Current development efforts are an outgrowth of advanced developments that culminated with the operational tests of a submarine terminal through the Extremely High Frequency Lincoln Experimental Satellites 8 and 9. Based on these results and the acknowledged need to field a wartime satellite communications system, the Office of the Secretary of the Navy, in July 1981, formally directed that planning for Extremely High Frequency initial spacecraft processor package development and deployment commence. As structured, the program is concurrent in schedule to the terminal development effort. Specification of the package will be completed in the first quarter of FY 1982, with development commencing in early FY 1982. Two flight packages and a ground qualification processor package will be developed. The flight processor packages will subsequently be integrated into FLTSAT 7 and 8 and launched in the FY 1986 timeframe to support terminal test and evaluation.

(U) RELATED ACTIVITIES: Future fully operational Extremely High Frequency spacecraft package development will be coordinated with the Air Force. The Navy terminals developed under this program are designed to operate with the Extremely High Frequency packages of the Air Force Military Strategic Tactical and Relay (MILSTAR) System. Concurrently, the Army is exploring the applicability of Extremely High Frequency satellite communications and is formulating and Extremely High Frequency Single Channel Objective Tactical Terminal Program for ground force use. The Defense Communications Agency is responsbile for consolidating satellite communications requirements and addressing future Satellite Communications planning. Internal to Navy, the Navy Extremely High Frequency terminal project develops and fields spacecraft processor package compatible terminals.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, New London, CT; Naval Air Development Center, Warminister, PA; Navy Postgraduate School, Monterey, CA. Contractors: Harris, Melbourne, FL; Raytheon, Sudbury, MA; Rockwell International, Newport Beach, CA; Lincoln Laboratory, Lexington, MA; TRW, Redondo Beach, CA; and Hughes, Los Angeles, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The concept that communications in the Extremely High Frequency band with a satellite was confirmed by the results of the CLARINET OMEN/Lincoln Laboratory Experimental Satellite and AN/WSC-7 developments. Subsequent Chief of Naval Operations action directed the concept be extended to all Navy mobile platforms and led to the formulation of the

Project: X1660
Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Navy Extremely High Frequency Space Segment
Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

present terminal program. System Definition and Concept validation have been completed for the terminal. Effort commenced to ensure compatibility between terminals and the design of the space package, witn Lincoln Laboratory providing initial spacecraft processor package specifications.

2. (U) FY 1982 Program: Terminal full scale development commences second quarter FY 1982. Laboratory and/or industrial contractors will be selected to begin building processor packages. Monitoring of contractor efforts by Navy laboratories will continue into host spacecraft integration. Funding provided is due to Congressional action to commence package development and ensure purchase of long-lead parts.

3. (U) FY 1983 Planned Program: Selected developer will build two flight packages and a ground qualification model. Tentative hosts are FLTSAT 7 and 8. Monitoring of developer efforts by Navy laboratories will continue into host spacecraft integration Increased funding of previous year is due to parts delivery and package breadboard/assembly. Funding transition from Program Element 33109N to Program Element 64577N to allow aggregation of Extremely High Frequency funding.

4. (U) FY 1984 Planned Program: Development of Extremely High Frequency processor packages will continue at selected developer's plant. Laboratory will assist in monitoring contract, design of equipment and testing.

5. (U) Program to Completion: Processor package development continues with integration into host spacecraft projected for FY 1985, with launches of host vehicle scheduled for FY 1986. Spaceborne packages will be used to test and evaluate the full scale development terminals, and to provide an Extremely High Frequency operational Capability into the early 1990's.

6. (U) Milestones:

Milestones	Fiscal Year
1. Specifications Completed	1st QTR/82
2. Contract Award	2nd QTR/82
3. Commence Long-Lead Fully Operational Spacecraft	1st QTR/85
4. Package Integration	2nd-4th QTR/85
5. Space Package Launch	1st-3rd QTR/86
6. Operational Status	3rd-4th QTR/86
7. Launch Fully Operational Spacecraft	2nd QTR/91

Project: X1660
Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Navy Extremely High Frequency Space Segment
Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X1660	Navy Extremely High Frequency Space Segment	0	**	23,930	37,278	56,400	135,378

**FY 1982 funds provided under Program Element 11403N (HYDRUS) but not identified as a separate project.

Project: X1660
Program Element: 64577N
DoD Mission Area: 363 - Common User Communications

Title: Navy Extremely High Frequency Space Segment
Title: Extremely High Frequency Satellite Communications
Budget Activity: 5 - Intelligence and Communications

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimte	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X1660	Navy Extremely High Frequency Space Segment	0	**	23,930	37,278	56,400	135,378

**FY 1982 funds provided under Program Element 11403N (HYDRUS) but not identified as a separate project.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64777N
Title: NAVSTAR Global Positioning System (GPS)
DoD Mission Area: 361 - Navigation and Position Fixing
Budget Activity: 5 - Intelligence and Communications

(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	22,002[1]	34,000	39,822	97,440	Continuing[2]	Continuing[2,3]
X0699	Clock Technology Development	1,033[1]	4,000	10,478	13,297	Continuing[2]	Continuing[2]
X0708	NAVSTAR Global Positioning System (GPS)	3,833[1]	1,800	3,220	420	1,415	47,782
X0921	NAVSTAR Global Positioning System (GPS) User Equipment	17,136[1]	28,200	26,124	83,723	199,424	376,662[3]

1. The total actual cost includes FY 1981 and prior funding under Program Elements 63401N (projects X0699 and X0708) and 64778N (project X0921).

2. Atomic Clock development will continue until such time as a stable, reliable and accurate frequency standard is operational.

3. The total estimated cost includes prior funding app. d under Program Element 63401N, Project X1089.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports development of the Navy's portion of the Joint Service NAVSTAR Global Positioning System. This system will consist of at least 18 satellites, 3 master ground control stations, and user equipment in vehicles, ships, airplanes, and portable manpacks. Fundamental to the successful accomplishment of military missions is the ability to precisely position friendly forces relative to each other and with respect to enemy forces. The NAVSTAR Global Positioning System will fulfill the military need t provide global, highly accurate positioning/navigation information to a broad spectrum of military and civilian missions. The program element includes funds to develop atomic frequency standards for the NAVSTAR Global Positioning System, to participate in the Joint Program Office for Phase II Full Scale Development of NAVSTAR Global Positioning System, and to support the Navy's portion of the Joint Service NAVSTAR Global Positioning System user equipment development and integration unique to Navy platforms. The Defense Systems Acquisition Review Council II of 5 June 1979, and the Secretary of Defense memorandum of 24 August 1979. approved program transition into Phase II Full Scale Development.

(U) BASIS FOR FY 1983 RDT&E REQUEST: In July 1979. upon completion of Phase I Concept Validation, two contractors were selected to commence competitive engineering development of user equipment. The Navy is funding a portion of these contracts and monitoring efforts directed toward airborne, submarine, and shipborne aspects of the development unique to the Navy. A major portion of

Program Element: 64777N Title: NAVSTAR Global Positioning System (GPS)
DoD Mission Area: 361 - Navigation and Position Fixing Budget Activity: 5 - Intelligence and Communications

the FY 1983 RDT&E effort is directed toward user equipment integration on Navy initial operational test and evaluation platforms. During Phase II, frequency standard efforts will entail additional development to provide an extremely accurate and reliable frequency standard for the NAVSTAR Global Positioning System satcilites in Phases II and III. The Navy's role will include design improvements, reliability verification, and radiation hardening performed by competing contractors and Navy laboratories. Operational testing conducted to date has shown that the greatest technic l problem affecting the performance of the NAVSTAR Global Positioning System is the reliability of atomic frequency standards. The major part of the increase between FY 1982 and FY 1983 (5,822 thousand) reflects increased efforts to improve atomic frequency standards reliability. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated for all projects except X0699 which is 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 Summaries for Program Elements 63401N and 64778N and this Descriptive Summary result from: The decrease of 202 in FY 1981 is the result of refined cost estimates including inflation indicies, the FY 1982 decrease of 17,905 results from a Congressional action which terminated funding for Program Elements 63401N and 64778N, and authorized 34,000 for the NAVSTAR Global Positioning System; changes in escalation indices; a stretchout of clock technology development to coincide with operational satellite employment; additional costs of 2,841 in FY 1983 are associated with field test and evaluation and the system integration laboratories; additional user equipment platforms; and a shifting of Navy support from advanced development to engineering development.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARIES
Program/

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
63401N	TOTAL FOR PROGRAM ELEMENT	9,618	4,907	17,071	16,484	Continuing*	Continuing*
X0699	Clock Technology Development	7,073	1,041	13,180	12,596	Continuing*	Continuing*
X0708	NAVSTAR Global Positioning System (GPS)	2,545	3,866	3,891	3,888	11,566	60,860
64778N	TOTAL FOR PROGRAM ELEMENT	10,072	17,297	34,834	20,497	150,211	244,735**
X0921	NAVSTAR Global Positioning System (GPS) User Equipment	10,072	17,297	34,834	20,497	150,211	244,735**

*Atomic clock development will continue until such time that a stable, reliable and accurate frequency standard is operational.
**The total estimated cost includes prior funding appropriated under Program Element 63401N.

Program Element: 64777N
DoD Mission Area: 361 - Navigation and Position Fixing

Title: NAVSTAR Global Positioning System (GPS)
Budget Activity: 5 - Intelligence and Communications

(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
	OPN					38,364*	38,364*
	APN					77,728*	77,728*

*Procurement funds for FY 1985 through FY 1987 only.

Program Element: 64777N Title: NAVSTAR Global Positioning System (GPS)
DoD Mission Area: 361 - Navigation and Position Fixing Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: The first of three evolutionary phases for NAVSTAR Global Positioning System was approved by the Deputy Secretary of Defense on 22 December 1973, following the Defense Systems Acquisition Review Council I. On 24 August 1979, the Secretary of Defense approved the second phase after the Defense Systems Acquisition Review Council II. Establishment of a worldwide, three dimensional Satellite Constellation is expected in 1988. Emphasis is placed upon the fullest possible assessment of user requirements, user equipment design, cost and performance trade-offs and minimization of system life-cycle costs. The operational system will consist of 18 satellites to transmit the positioning signals and provide continuous, global coverage, user equipment for all Services, and a ground-based control segment to monitor and update the satellite navigation subsystems. Each user will be able to determine precisely his position (to better than 16 meters accuracy) and velocity (within tenths of a meter per second), in three dimensions, anywhere in the world in all types of weather conditions. In addition, precise time will be available, accurate to fractions of a micro-second. Provisions will be made to deny use of the system to enemy forces. The master control station will be located within the continental United States with monitor stations throughout the world.

(U) Six NAVSTAR Global Positioning Satellites, prototypes of those to be deployed for the operational system, and two Navigation Technology Satellites developed by the Naval Research Laboratory have been placed in 11,000 nautical mile orbits. The NAVSTAR satellites have provided the signals required for three-dimensional testing of Global Positioning System user equipment in the designated test area in support of the approved concept validation program. Aditional satellites will be launched to establish and maintain a constellation of five satellites to provide support to the Navy's Fleet Ballistic Missile Improved Accuracy Program. This will provide increased test time for precise tracking of missile trajectories.

(U) Each Service is responsible for establishing user equipment performance characteristics which will impact upon satellite and user equipment design. Service participation is for the purpose of developing and testing a family of equipment having the greatest commonality and at the same time meeting the Services' needs.

(U) This program element contains three projects--one for clock technology development, one for Navy's support of the Joint Program Office and Phase II development of user equipment, and one for user equipment development and integration unique to Navy platforms. Project Y0699 provides for frequency standard development with primary effort directed toward improving cesium standards for Phase II satellites and developing hydrogen maser standards for Phase III satellites. Project X0708 provides for a variety of Navy Systems Commands and Laboratory expertise for (1) management support to the Joint Service development and (2) the Navy unique development for user platforms. Project Y0521 provides funding for Navy's share of user equipment prototype development contracts and integration unique to Navy platforms.

(U) RELATED ACTIVITIES: This is a joint program with all Services participating. The Air Force is the executive agent. All Navy NAVSTAR Global Positioning System funds are carried in Program Element 64777N. Prior year funds were carried in Program

Program Element: 64777N Title: NAVSTAR Global Positioning System (GPS)
DoD Mission Area: 361 - Navigation and Position Fixing Budget Activity: 5 - Intelligence and Communications

Elements 63401N, NAVSTAR Global Positioning System (GPS) and 64778N NAVSTAR Global Positioning System (GPS) User Equipment. Other Service development funding for the joint program is contained in Program Elements 63403A and 63521F. Army and Air Force funds for full scale development are carried in Program Elements 64778A and 64778F, respectively.

(U) WORK PERFORMED BY: In-House: Program Direction: Navy Space Project Office, Naval Electronic Systems Command, Washington, DC; Navy Space Systems Activity, Los Angeles, CA. Principal Technical Support: Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; Naval Ocean Systems Center, San Diego, CA. Clock Technology Development Contractors: Hughes Aircraft Company, Malibu Beach, CA; Kern Company, Danvers, MA; Frequency Electronics, Inc., New Hyde Park, NY; Frequency and Time Systems, Inc. Beverly, MA. User Equipment Development Contractors: Rockwell Collins, Cedar Rapids, IA; Magnavox Government and Industrial Electronics, Torrance, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1981 and Prior Accomplishments: The NAVSTAR Global Positioning System was previously funded by Program Elements 63401N NAVSTAR Global Positioning System and 64778N NAVSTAR Global Positioning System User Equipment. Navigation Technology Satellites launched in 1974 and 1977 demonstrated suitability of atomic frequency standards in satellite applications. Due to unreliable performance of the rubidium and cesium frequency standards, an integrated management approach to the improvement, development and deployment of frequency standards was established. Contracts were awarded for competitive development of improved cesium frequency standards and for a hydrogen maser frequency standard. Developmental user equipment was tested on the Yuma Test Range, Arizona, at sea off the California coast, and during fleet exercises. Two contracts were awarded to develop prototype user equipment in July 1979. Concept validation was completed with extensive evaluations of the various user equipment and platform interfaces. Preparatory deployment and integration planning was completed for equipment installation for initial operational test and evaluation in FY 1983 and FY 1984 on an aircraft carrier, a submarine, and A-6 and P-3 aircraft.

2. (U) FY 1982 Program: Project X0699: Preproduction improved cesium standards will be delivered, evaluated and integrated into NAVSTAR satellites. Project X0708: Integration and installation planning will continue for prototype user equipment on Navy platforms. Project X0921: Continue contractor parallel development of prototype user equipments (antenna, receiver/processor, and flexible modular interfaces) for integration into a submarine, an aircraft carrier, and an A-6 aircraft for developmental and operational test and evaluation.

3. (U) FY 1983 Planned Program: Project X0699: Remaining prototype cesium standards will be delivered, tested and integrated into NAVSTAR satellites. Hydrogen maser frequency standards development and increased reliability efforts will continue. Project X0708: Phase II testing will be initiated on Navy initial operational test and evaluation platforms. Project X0921: Ini-

tial prototype user equipments will be delivered and subjected to developmental test and evaluation. After factory testing, user equipments will be delivered to the Services for installation on initial operational test and evaluation host platforms. First set delivery is scheduled for November 1982.

4. (U) FY 1984 Planned Program: Project X0699: A prototype hydrogen maser standard will be fabricated and delivered for testing. Production models of an improved cesium standard will receive final testing prior to first production launch of NAVSTAR satellites. Project X0708: Phase II testing of NAVSTAR Global Positioning System user equipment will be continued for Navy platforms. Project X0921: Installation tests, evaluation of prototype user equipments in various environments, and initial operational test and evaluation will continue. Analysis of operational test and evaluation results will be completed for assessment by the Defense Systems Review Council III. Assuming approval, continue user equipment development and design the interfaces for this equipment for remaining Navy platforms receiving NAVSTAR Global Positioning System user equipment.

5. (U) Program to Completion: Project X0699: This is a continuing project. Hydrogen maser development will continue until the frequency standard is ready for use in Phase III NAVSTAR satellites. Project X0708. Continue to support to the Navy's Fleet Ballistic Missile Improved Accuracy Program throughout the 1980's and an operational three-dimensional capability by 1988. Project X0921: Continue to design the interfaces and equipment installations and to conduct testing of the first platform for each Navy platform type receiving NAVSTAR Global Positioning System user equipment.

6. (U) Milestones:

MILESTONE		DATE
1. Defense Systems Acquisiti Review Council II		June 1979
2. Cesium Prototype Deliverie.		1982-1933
3. Cesium Production Model Del ery		1984
4. User Equipment Initial Operational Test and Evaluation Completed	(August 1983)*	April 1984
5. Defense Systems Acquisition Review Council III	(September 1983)*	May 1984
6. Hydrogen Maser Engineering Development Model Delivery		1984-1985
7. 18 Satellite Constellation established		1988

*Dates shown in the FY 1982 Descriptive Summary. Schedule was changed due to inability of user equipment contractors to procure required integrated circuits.

Project: X0699 — Title: Clock Technology Development (Formerly Hydrogen Maser Development)

Program Element: 64777N — Title: NAVSTAR Global Positioning System (GPS)

DoD Mission Area: 361 - Navigation and Position Fixing — Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: This project funds the development of atomic frequency standards for use in NAVSTAR Global Positioning System satellites. Since NAVSTAR Global Positioning System technology requires an extremely accurate time reference, it is necessary to design and deploy on global positioning satellites a very reliable and precise frequency standard. The more precise the time standard, the more accurate the measurement of position and velocity. The more stable the frequency standard, the less frequently corrections have to be made by the ground control station. NAVSTAR Global Positioning System will provide the very accurate navigation and positioning information required to perform most military missions with greater effectiveness. Currently, emphasis is being directed toward improving the reliability and stability of cesium frequency standards and in the development of a follow-on hydrogen maser standard for space applications. Results of operational testing of NAVSTAR Global Positioning System to date have shown that atomic frequency standard reliability is the only major technical problem remaining in this program.

(U) RELATED ACTIVITIES: This project supports NAVSTAR Global Positioning System which is a joint program with all Services participating. The Air Force is executive agent. Other Service advanced development funding for the joint program is contained in Program Elements 63403A and 63421F. Navy funds for prototype user equipment development are carried in Project X0921. Army and Air Force funds for full scale development are in Program Elements 64778A and 64778F, respectively.

(U) WORK PERFORMED BY: In-House: Navy Space Project Office, Naval Electronics Systems Command, Washington, DC and Naval Research Laboratory, Washington, DC. Contractors: Hughes, Malibu Beach, CA; Kern Company, Danvers, MA; Frequency Electronics Inc., New Hyde Park, NY; and Frequency and Time Systems, Inc., Beverly, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Navigation Technology Satellites launched in 1974 and 1977 demonstrated suitability of atomic frequency standards in satellite applications. As a result of these tests, rubidium and cesium clock prototypes were built and installed in NAVSTAR Global Positioning System concept validation satellites. When it became apparent that the performance of the frequency standards on Global Positioning System satellites was unreliable, a clock improvement plan was approved in FY 1980 to establish an integrated management approach to the development and deployment of improved atomic frequency standards. The major objective of the clock plan was to look at other atomic frequency standard sources and to conduct extensive laboratory testing of atomic clocks to determine which standards would be deployed in future NAVSTAR Global Positioning System satellites. In accordance with this plan, two additional contracts were awarded for competitive development of improved cesium frequency standards. A contract was also awarded to Hughes to work along with the Naval Research Laboratory in developing a follow-on hydrogen maser standard. Clock designs were analyzed for reliability, stability, radiation hardening and suitability for satellite installation.

Project: X0699

Title: Clock Technology Development
(Formerly Hydrogen Maser Development)

Program Element: 64777N

Title: NAVSTAR Global Positioning System (GPS)

DoD Mission Area: 361 - Navigation and Position Fixing

Budget Activity: 5 - Intelligence and Communications

2. (U) FY 1982 PROGRAM: Preproduction models of improved cesium standards will be delivered, tested and integrated into NAVSTAR replenishment satellites. Radiation test models from each of the cesium clock contractors will be delivered during the early part of the fiscal year with additional prototypes from each contractor being delivered for testing later in FY 1982.

3. (U) FY 1983 PLANNED PROGRAM: Remaining preproduction cesium standards will be delivered and tested at the Naval Research Laboratory which will have full capability to conduct long term tests of cesium clocks and will collect technical data on clock performance. Based on testing results, a decision will be made and contract(s) awarded for follow-on cesium clock production. Design and development of hydrogen maser standards will be resumed.

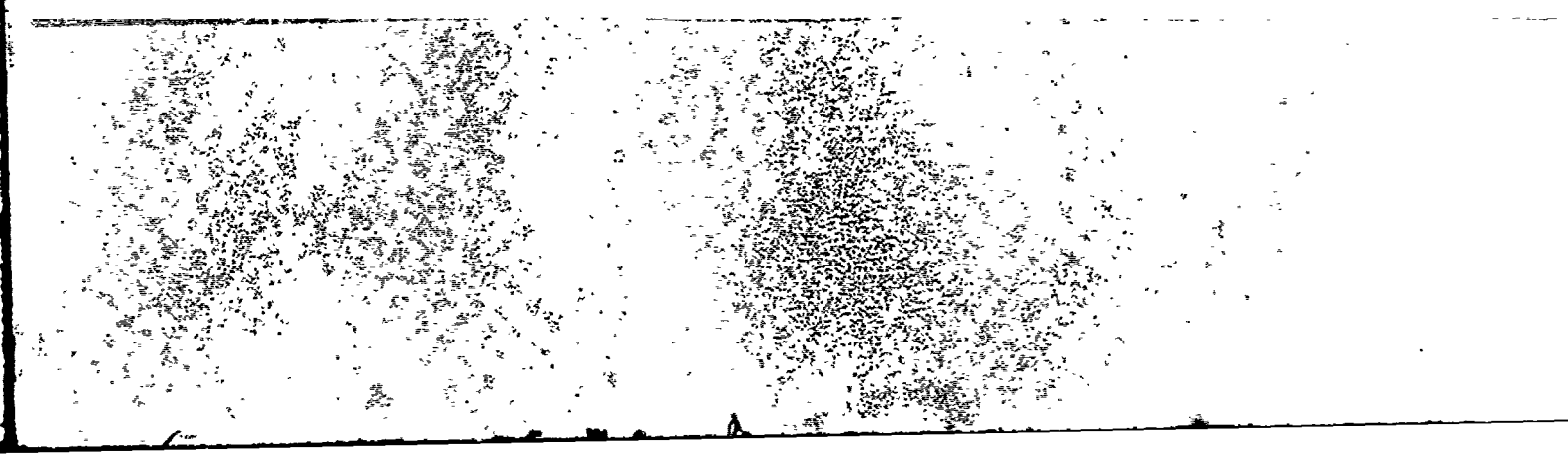
4. (U) FY 1984 PLANNED PROGRAM: A prototype hydrogen maser standard will be fabricated for completion and delivery in late 1984 or early 1985. Production models of improved cesium standards will undergo final testing prior to installation on satellites. Expansion of the long term test facility at the Naval Research Laboratory will be completed so that long term thermal, vacuum and stress testing for genetic failures and reliability verification can be conducted on up to 12 cesium clocks.

5. (U) PROGRAM TO COMPLETION: This is a continuing program. Development of a hydrogen maser frequency standard will continue until such time that it will be ready for employment on operational satellites. Testing of a prototype hydrogen maser standard will commence in 1985.

6. (U) MILESTONES:

		DATES
1. Space Brassboard Completed (cesium)		December 1978
2. Defense Systems Acquisition Review Council II		June 1979
3. Cesium Engineering Development Model Deliveries		1979-1980
4. Improved Cesium Contract Awards		March, June 1980
5. Hydrogren Maser Contract Award		August 1980
6. Improved Cesium Prototype Deliveries		1982-1983
7. Defense Systems Acquisition Review Council III	(1983)*	May 1984
8. Cesium Production Model Deliveries		1984
9. Hydrogen Maser Engineering Development Model Delivery	(1984)*	1984-1985

*Dates shown in the FY 1982 Descriptive Summary. Schedule for Defense System Acquisition Review Council III was changed due to inability of user equipment contractors to procure required integrated circuits. Slippage in delivery of a hydrogen maser model due to insufficient funding in FY 1982.



Project: X0699

Title: Clock Technology Development
(Formerly Hydrogen Maser Development)

Program Element: 64777N

Title: NAVSTAR Global Positioning System (GPS)

DoD Mission Area: 361 - Navigation and Position Fixing

Budget Activity: 5 - Intelligence and Communications

7. (U) RESOURCES

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0699	Clock Technology Development	1,033*	4,000	10,478	13,297	Continuing**	Continuing**

*Actual cost funding provided under Program Element 63401N.

**Atomic clock development will continue until such time that a stable, reliable and accurate frequency standard is operational.

Project: X0921
Program Element: 64777N
DoD Mission Area: 361 - Navigation and Position Fixing

Title: NAVSTAR Global Positioning System (GPS) User Equipment
Title: NAVSTAR Global Positioning System (GPS)
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: This project funds the Navy's portion of the NAVSTAR Global Positioning System user equipment development and integration unique to Navy platforms. Fundamental to the successful accomplishment of military functions is the ability to precisely position friendly forces relative to each other and with respect to enemy forces. Extensive investigations, analysis, and tests by all the Services have confirmed the feasibility of a highly precise, satellite based positioning system capable of satisfying a broad spectrum of Department of Defense positioning requirements. The utility of such a system is realized by its ability to provide the user with the required precision for accurate weapons delivery, anywhere, in all weather conditions, day or night. The first of three evolutionary phases for NAVSTAR Global Positioning System was approved by the Secretary of Defense on 22 December 1973, following the Defense Systems Acquisition Review Council I. On 24 August 1979, the Secretary of Defense approved the second phase following the Defense Systems Acquisition Review Council II. The Defense Systems Acquisition Review Council III is scheduled for 1984 as part of the decision process to proceed to the third phase, Full Scale Development. A worldwide 3-D capability with the 18 satellite constellation is expected in 1988.

(U) Emphasis is placed on the fullest possible assessment of user requirements, user equipment design, cost and performance tradeoffs and minimization of system life-cycle costs. The user equipment being developed by the Joint Program Office includes man-packs, units for wheeled and tracked vehicles, ships and submarines, and avionics for many types of aircraft. These equipments will have high commonality and interchangeability of parts. Each Service is responsible for establishing user equipment performance characteristics which will impact upon satellite and user design to meet its needs. Service participation is for the purpose of developing and testing a family of equipments having the greatest commonality and at the same time meeting the Services' needs.

(U) RELATED ACTIVITIES: This project supports NAVSTAR Global Positioning System user equipment development as part of a joint program with all Services participating. The Air Force is the executive agent. Other Service advanced development funding for the joint program is contained in Program Elements 63403A and 63421F. Army and Air Force funds for full scale development are in Program Elements 64778A and 64778F. Navy funds for clock technology development are contained in Project X0699.

(U) WORK PERFORMED BY: In-House, respectively: Program Direction: Navy Space Project Office, Naval Electronic Systems Command, Washington, DC; Navy Space Systems Activity, Los Angeles, CA. Principal Technical Support: Naval Air Development Center, Warminster, PA; Naval Avionics Center, Indianapolis, IN; Naval Ocean Systems Center, San Diego, CA. Contractors: Rockwell Collins, Cedar Rapids, IA; Magnavox Government and Industrial Electronics, Torrance, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The NAVSTAR Global Positioning System user equipment was previously funded in Program Element 63401N, Project X1089, Navigation Satellite Timing and Ranging Global Positioning System User Equipment for FY 1978 and in

Project: X0921 Title: NAVSTAR Global Positioning System (GPS) User Equipment
Program Element: 64777N Title: NAVSTAR Global Positioning System (GPS)
DoD Mission Area: 361 - Navigation and Position Fixing Budget Activity: 5 - Intelligence and Communications

Program Element 64778N, Project X0921 from FY 1979 through FY 1981. Developmental user equipment was tested on the Yuma Test Range, Arizona, at sea off the California coast and during fleet exercises. Two contracts were awarded to develop prototype user equipment in July 1979 to Magnavox and Rockwell Collins. Concept validation was completed with extensive evaluations of the various user equipment and platform interfaces.

2. (U) FY 1982 Program: Continue contractor parallel development of prototype user equipments (antenna, receiver/processor, and flexible modular interfaces) for integration into a submarine, and aircraft carrier, and an A-6 aircraft for developmental and operational test and evaluation.

3. (U) FY 1983 Planned Program: Initial prototype user equipments will be delivered and subjected to Developmental Test and Evaluation. After factory testing, user equipment will be delivered to the Services for Developmental Test and Evaluation and installation on Initial Operational Test and Evaluation host platforms. First set delivery is scheduled for November 1982.

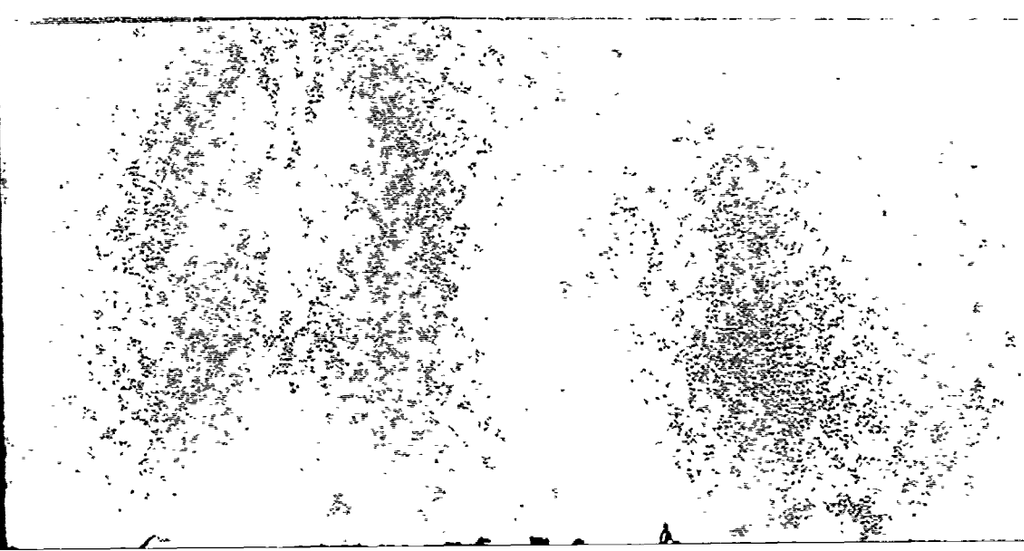
4. (U) FY 1984 Planned Program: Installation tests, evaluation, of prototype user equipments in various environments, and initial operational test and evaluation will continue. Analysis of operational test and evaluation results will be completed for assessment by Defense Systems Acquisition Review Council III. Assuming approval, continue user equipment development and design the interfaces for this equipment for remaining Navy platforms receiving NAVSTAR Global Positioning System user equipment.

5. (U) Program to Completion: Continue to design the interfaces and equipment installations and to conduct testing of the first platform for each Navy platform type receiving NAVSTAR Global Positioning System user equipment.

6. (U) Milestones:

	Milestone		Date
1.	Defense Systems Acquisition Review Council II		June 1979
2.	Awarded contracts for prototype user equipment development		July 1979
3.	Complete User Equipment Initial Operational Test and Evaluation	(August 1983)*	June 1983
4.	Defense Systems Acquisition Review Council III	(September 1983)*	May 1984
5.	18 Satellite Constellation established		1988

* Dates shown in FY 1982 Descriptive Summary. Schedule change due to inability of user equipment contractors to procure required integrated circuits.



Project: X0921 Title: NAVSTAR Global Positioning System (GPS) User Equipment
Program Element: 64777N Title: NAVSTAR Global Positioning System (GPS)
DoD Mission Area: 361 - Navigation and Position Fixing Budget Activity: 5 - Intelligence and Communications

7. (U) RESOURCES

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
X0921	NAVSTAR Global Positioning System User Equipment	17,136*	28,200	26,124	83,723	202,601	380,986**

*Actual cost funding provided under Program Element 64778N.

**Total estimated cost includes prior funding appropriated under Program Element 63401N, Project X1089 and Program Element 64778N, Project X0921.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65803N
Title: Electromagnetic Spectrum Management
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

(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	5,700	5,496	4,589	7,532	Continuing	Continuing
Z0706	Electromagnetic Compatibility and Radio Frequency Management	5,700	5,496	4,589	7,532	Continuing	Continuing

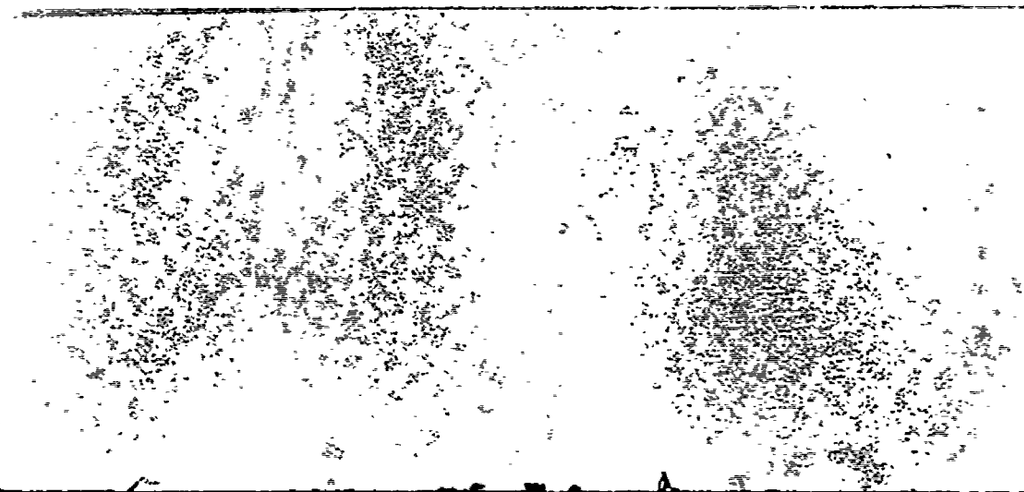
(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program reduced electromagnetic interference. It develops the tools, techniques, and equipment for increasing the effectiveness of communications and weapons systems and provides electromagnetic spectrum compatibility analyses during the development, operation and maintenance of Navy equipment, systems, and platforms.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue development efforts which improve electromagnetic compatibility techniques and doctrine, Integrate electromagnetic compatibility technology with other electromagnetic environmental effects technologies. 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 PROGRAM ELEMENT 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 in FY 1981 of 345 due to revision of inflation indices, a decrease in FY 1982 of 2,196 and FY 1983 of 2,573 arising from general reduction to the Navy RDT&E budget.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,377	6,045	7,692	7,162	Continuing	Continuing
X0706	Electromagnetic Compatibility and Radio Frequency Management	5,377	6,045	7,692	7,162	Continuing	Continuing



Program Element: 65803N
DoD Mission Area: 363 - Common User Communications

Title: Electromagnetic Spectrum Management
Budget Activity: 5 - Intelligence and Communications

(U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN	0	0	897	1,664	Continuing	Continuing

Program Element: 65803N
Title: Electromagnetic Spectrum Management
DoD Mission Area: 363 - Common User Communications
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: As electronic systems have increased in complexity to meet more demanding needs of the operations of the U. S. Navy, electromagnetic interference has caused serious degradations and deficiencies in the performance of equipment, systems, and platforms. Most of these problems result from inadequacies in available technology and doctrine. A decision of the Chief of Naval Operations Executive Board directed efforts both to correct current problems and to prevent future deficiencies in the material development cycle. The overall objective of this project is to develop the techniques, tools, doctrine, and conduct electromagnetic spectrum analyses required to achieve electromagnetic compatibility of Navy equipment and systems in an operational environment. These products are applied during the life cycle of development, test, operations, and maintenance. Objectives of the separate project tasks are: Task (1) Electromagnetic Compatibility/Radio Frequency Analysis: Conduct analyses of equipments, systems, and platforms with potential electromagnetic incompatibilities and advise acquisition managers of needed corrective actions. Document the established and newly-emerging techniques and data to control electromagnetic environmental effects for incorporation in Navy and Department of Defense standards, specifications, and manuals for use in design, installation, modification, and operation of Navy equipment, systems and platforms. Develop software for the purpose of permitting real-time assignment of frequencies for U. S. Navy tactical communications, radars, and weapon systems to achieve interference-free operations in the crowded electromagnetic spectrum. Task (2) World Administrative Radio Conferences: Perform technical analyses to develop the U. S. Navy positions in the World Administrative Radio Conferences of the International Telecommunication Union. Task (3) Combat Readiness Electromagnetic Analysis and Measurement: Develop technology for the detection, measurement, and analysis of electromagnetic interference in the shipboard environment, and improved test procedures and test equipment prototypes for use by ship's personnel. Task (4) Shipboard Sensor Exerciser: Develop a multi-purpose, fleet usable, portable, stand alone system for evaluating the performance of ship sensor (radar and electronic countermeasure) systems. Task (5) Electromagnetic Environmental Effect Technologies: Develop the tools, techniques, facilities, and procedures for the integrated application of related technologies into fleet support and material acquisition programs. Task (6) Interference Suppression Modules: Develop prototype add-on interference suppression modules for communications and weapon systems, using time and frequency blanking, phase data integration, and other emerging techniques. Task (7) Radiation Measurement Methodology for Shipboard Safety: Develop a firm methodology for assessing personnel hazards due to electromagnetic radiation. Task (8) Automated Design Aid: Develop methodology to ensure that electromagnetic compability is included in ship design and modernizations.

(U) RELATED ACTIVITIES: Non-redundant efforts for the identification and correction of known deficiencies on operational equipments, ships, and aircraft are being carried out in operational and maintenance projects and in exploratory, advanced, and engineering developmental projects unique to acquisition or maintenance of specific systems. This project provides the management and technical tools for related efforts to succeed.

(U) WORK PERFORMED BY: In-House: Naval Surface Weapons Center, Dahlgren, VA; Electromagnetic Compatibility Analysis Center, Annapolis, MD; Naval Ocean Systems Center, San Diego, CA; Naval Research Laboratory, Washington, DC; Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, Newport, RI.

Program Element: 65803N
DoD Mission Area: 363 - Common User Communicatioons

Title: Electromagnetic Spectrum Management
Budget Activity: 5 - Intelligence and Communications

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The program was initiated in FY 1978 with electromagnetic compatibility analyses for five development projects and the development of standards for electromagnetic compatibility testing and for limits of power line transient susceptibility. Through FY 1981, the analyses project (Task 1) continued, the standard development was expanded to include more comprehensive electromagnetic compatibility criteria, and development of automated frequency assignment software started. Technical support for the 1979 World Administrative Radio Conference (Task 2) was completed. Hardware development was initiated for Combat Readiness Electromagnetic Analysis and Measurement equipments (Task 3), Shipboard Sensor Exerciser (Task 4), Electromagnetic Environmental Effects technology integration (Task 5), and Interference Suppression Modules (Task 6). Development started on radiation hazard measurement methodlogy (Task 7).

2. (U) FY 1982 Program: Task 1 - Continue analysis program, automatic frequency assignment software development, and development of standards and specifications relating to electromagnetic compatibility. Task 2 - Continue technical support for specialty sessions of the World Administrative Radio Conference of particular significance to Navy. Tasks 3, 4, 5, 6, and 7 - continue planned development and testing.

3. (U) FY 1983 and FY 1984 Planned Programs: Task 1 - Continue electromagnetic compatibility analysis program, continue standards development, and complete development and begin test of radar/electronic warfare subsystem of automated frequency assignment system. Task 2 - Continue technical analyses and develop position papers for specialized World Administrative Radio Conference. Task 3 - Complete Task 3 in 1984, test, and evaluate prototypes of the equipments and begin procurement. Continue development and test and evaluation of two other equipments. Task 4 - Transfer to 6.4 program. Task 5 - Continue electromagnetic environmental effects technology integration and data base consolidaton. Task 6 - Continue development, test and evaluation of prototype modules and begin procurement. Initiate development of modules to correct problems in radar and aircraft systems. Task 7 - Complete shipboard measurement techniques and transfer to fleet operations. Task 8 - Initiate automated design and methodology to ensure electromagnetic compatibility of new ships and modernization.

4. (U) Program to Completion: Tasks 1, 2, 5, and 8 are continuing programs. Tasks 6 and 7 - Complete in FY 1985. Other tasks will be initiated resulting in a continuous but changing program.

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65866N
DoD Mission Area: 363 - Common User Communications

Title: Command and Control Systems Planning/Engineering Support
Budget Activity: 5 - Intelligence and Communications

(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	3,271	4,215	5,060	6,836	Continuing	Continuing
X0739	Telecommunications System Archictecture Support	1,396	1,380	2,029	3,432	Continuing	Continuing
X0740	Telecommunications Engineering Support	1,875	2,835	3,031	3,404	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides continuing systems engineering and planning support to the development of Navy Command and Control systems and defines the research, development, centralized control and management required to emplace a Navy Command and Control System which has the desired properties of responsiveness, reliability, survivability, flexibility, security and interoperability.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue command, control and communications system engineering and coordination of integrating Command and Control Communications, Surveillance and Intelligence systems. Incorporate NATO and joint service command and control interoperability 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 decreases of 272 in FY 1981, 1,109 in FY 1982 and 620 in FY 1983 are the result of refinement of estimates including escalation and budgetary adjustments (in FY 1982 and FY 1983).

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Program Element: 65866N
DoD Mission Area: 363 - Common User Communications

Title: Command and Control Systems Planning/Engineering Support
Budget Activity: 5 - Intelligence and Communications

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,587	3,543	5,324	5,680	Continuing	Continuing
X0739	Command Control Communications Telecommunications System Planning Support	1,051	1,479	1,864	2,219	Continuing	Continuing
X0740	Command Control Communications System Engineering Support	2,536	2,064	3,460	3,461	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: None.

Program Element: 65866N
DoD Mission Area: 363 - Common User Communications

Title: Command and Control Systems Planning/Engineering Support
Budget Activity: 5 - Intelligence and Communications

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element is used to investigate unresolved command, control and communication issues and problems. Efforts will develop command, control and communications planning and engineering guidelines covering all platforms, shore, space, airborne, surface and subsurface systems and subsystems including: information display, processing, transfer, and interlinking voice, data, narrative, and graphics. The work also includes close liaison with the Worldwide Military Command and Control System Engineer, Joint Tactical Communications, and Joint Interoperability of Tactical Command and Control Systems programs to ensure compatibility. This program element consists of two projects: System Planning Support (X0739) for command and control for formulating and refining command, control and communications system requirements; and System Engineering Support (X0740) for developing command, control and communications engineering design guidance for transitional and future systems.

(U) RELATED ACTIVITIES: This effort is related to Navy RDT&E efforts in command, control and communications, and to those of other military services, Defense Communications Agency, National Security Agency, Worldwide Military Command and Control System Engineer, the Joint Tactical Communications Office and the Joint Interoperability of Tactical Command and Control Systems Office.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, San Diego, CA; Naval Air Development Center, Warminster, PA; Naval Underwater Systems Center, New London, CT; Naval Research Laboratory, Washington, DC. Contractors: MITRE Corporation, McLean, VA; Applied Physics Laboratory, Johns Hopkins University (APL/JHU), Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Published Navy Telecommunications System Architecture and System Engineering Development Plan for implementation. Published the Command, Control and Communications Long Range System Plan. Performed engineering investigations of selected issues, including: the definitions of High Frequency ship/shore/ship and air/ground/air connectivity requirements, feasibility investigation of alternative satellite communications channel architectures and an investigation of alternative navigation and reporting systems to satisfy long-term requirements. Initiated Navy Shore Automation engineering assessment to determine impact of Automatic Digital Network II/Integrated Automatic Digital Network Architecture on Navy message handling. Published: updates to Naval Telecommunications System Engineering Development Plan; Threat Definition, Draft Baseline Description. Initiated consolidation of Long Range Systems Plan, Ocean Surveillance Master Plan, Over-the-Horizon Targeting Assessment and study of integrated tactical intelligence support system and shore based intelligence support to command, into a single integrated Navy Command and Control Plan, and published the Navy Command and Control Plan and the Near Term Over-the-Horizon Targeting Plan. Conducted engineering cost and technology feasibility examinations on future systems. Conducted engineering investigations to identify opportunities to: improve present High Frequency connectivity for ASW aircraft, assess various anti-jam line-of-sight communication systems to meet Navy intra-task force requirements and complete the Navy Automation Engineering Assessment. Updated Volume II of the Naval Telecommunication System Development Plan - Design Guidance.

Program Element: 65866N
DoD Mission Area: 363 - Common User Communications

Title: Command and Control Systems Planning/Engineering Support
Budget Activity: 5 - Intelligence and Communications

2. (U) FY 1982 Program: X0739: Command and Control System Planning Support: Perform analyses required for the planning and development of command and control facilities, ashore and afloat with supporting automation, communications networking and information transfers. Analyze fleet requirements by automated techniques. X0740: Command and Control System Engineering Support: Revise, maintain and reissue Communication System Engineering Development Plans. Initiate development of ship, submarine, and aircraft system design guidance documents. Perform Command, Control, Communication and Intelligence architectural analyses at the worldwide theater, and battle group levels.

3. (U) FY 1983/84 Planned Program: X0739: Command and Control System Planning Support: Perform various investigations relative to: interoperability with joint/Allied/NATO command and control systems, Intra Battle Group Communications support, consolidation of threat statements and Intra Battle Group Network Management. Update and perform additional analysis of the Navy Command and Control Requirements Data Base, Naval Warfare Data Base, and the Navy Command and Control Plan. Update a long-range command and control architecture studies. X0740: Command and Control System Engineering Support: Continue system engineering required to provide the Navy with currently approved command and control system performance levels.

4. (U) Program to Completion: X0739: Command and Control System Planning Support will continue in support of the Navy's command and control planning effort and to respond to needs identified in the Navy Command and Control Plan. X0740: Command and Control System Engineering Support will continue to provide detailed system engineering plans necessary to implement identified Navy Command and Control System requirements.

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 35111N Title: Weather Service
DoD Mission Area: 420 - Global Military Environmental Support Budget Activity: 6 - Defensewide Mission Support

(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	2,998	2,867	1,186	1,091	Continuing	Continuing
W0523	Satellite Data Processing System	975	920	948	1,091	Continuing	Continuing
X0922	Environmental Sensor Assessment	205	217	238	0	-	3,796
W0943	Automated Environmental Prediction System II	1,818	1,730	0	0	-	7,076

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element develops a satellite data processing center and associated software for receiving, processing and displaying data required for reliable and comprehensive environmental support of global naval operations.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Project W0523, Satellite Data Processing System - A satellite data processing system was implemented in FY 1979 to process data from the Defense Meteorological Satellite Program. This project keeps the satellite data processing system abreast of and compatible with advances in satellite sensor technology, data handling methods and automated analysis techniques. Continue development of applications and interactive display techniques using Defense Meteorological Satellite Program data and data from other satellites available at the processing site. Initiate program to share processed oceanographic satellite data with U.S. Air Force and the national civil meteorological satellite systems. Increase of 28 over FY 1982 results from inflation. Project X0922, Environmental Sensor Assessment - Continue evaluation of synergistic interactions of multi-source, multi-sensor environments and delineate critical factors affecting national policy issues. Increase of 21 over FY 1982 results from inflation and requirement to process increased amounts of synthetic aperture radar data. Project W0943, Automated Environmental Prediction System II - This project was transferred to O&MN BA 7, Program Element 78017N in FY 1983 during budget development. Decrease of 1730 under FY 1982 results from the transfer. 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 are as follows: The reduction of 137 in FY 1981 results from 23 taken during development of the FY 1981 supplemental budget and 114 reprogrammed from project W0943 to program element 64218N

to support development of the AN/SMQ-11 satellite receiver. The element was reduced 43 in FY 1982 during development of the FY 1982 budget amendment. The decrease of 4507 in FY 1983 results from reduced escalation rates (158), budget development decisions (463), sponsor removal of funding in recognition of reduced quantities of oceanographic satellite data that will be available to process (1192) and transfer of project W0943 from the RDT&E appropriation to O&MN (2694).

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

Project No.		FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,907	3,135	2,910	5,693	Continuing	Continuing
W0523	Satellite Data Processing System	1,086	975	932	2,698	Continuing	Continuing
X0922	Environmental Sensor Assessment	898	205	225	301	-	3,867
W0943	Automated Environmental Prediction System II	1,923	1,955	1,753	2,694	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS:

Not Applicable

Program Element: 35111N Title: Weather Service
DoD Mission Area: 420 - Global Military Environmental Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Project W0523, Satellite Data Processing System - Navy environmental support services are dependent upon parallel and i egrated development of satellite techniques, prediction techniques, associated display systems and parameterization of environmental effects upon naval operations. This system uses data from the Defense Meteorological Satellite Program and national satellite programs, in particular those satellites designed to provide oceanographic data, as well as atmospheric data. Applications software for direct fleet support and for input into the Automated Environmental Prediction System is being developed. Project X0922, Environmental Sensor Assessment - In September 1976, the Director of Defense Research and Engineering (now the Under Secretary of Defense for Research and Engineering) selected the Navy

This ocean dynamics research satellite contained sensors

The data from the radar altimeter could be used through improved knowledge of the earth's gravity field and geoid. The Synthetic Aperture Radar could provide data

These data,

To assess fully this potential

a systematic analysis of various sensor components was undertaken for the Department of Defense. Five basic tasks are involved: (a) Planning, (b) Laboratory investigations, (c) Ground-truth verification, (d)

(e)

In August 1980, the Under Secretary of Defense for Research and Engineering requested that the project be restructured

Project W0943, Automated Environmental Prediction System II - This project will be transferred to O&MN from the RDT&E appropriation.

(U) RELATED ACTIVITIES: Project W0524, Defense Meteorological Satellite Program Navy Support (PE 35160N) provides improved sensors for the satellite program from which data are received. Project W0513, Automated Environmental Prediction System (Program Element 63207N) provides the mechanism to ingest data output from the Satellite Data Processing System and develop the analysis and prediction models necessary to permit satellite data to improve environmental forecasts.

(U) WORK PERFORMED BY: In-House: Environmental Prediction Research Facility, Monterey, CA (lead activity for W0523, Satellite Data Processing System); Fleet Numerical Oceanography Center, Monterey, CA; Naval Oceanography Research and Development Activity, Bay St. Louis, MS; Naval Research Laboratory, Washington, DC (lead activity for X0922, Environmental Sensor Assessment); Navy Space Systems Activity, Los Angeles, CA. Contractors: Control Data Corporation, Minneapolis, MN; Ocean Data Systems Inc., Rockville, MD; Technical Development Corporation, Sunnyvale, CA; Telos Computing Inc., Santa Monica, CA; Educational Data Services, Sunnyvale, CA; Systems and Applied Sciences Inc., Riverdale, CA; Izhar Shy Industries Inc., Santa Anna, CA; Adaptive Sciences Corporation, Emoryville, CA; Lockheed Missile and Space Company, Sunnyvale, CA; Hughes Aircraft Company, Culver City, CA.

Program Element: 35111N Title: Weather Service
DoD Mission Area: 420 - Global Military Environmental Support Budget Activity: 6 - Defensewide Mission Support

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Project W0523, Satellite Data Processing System - Attained initial operational capability on 16 March 1979. Processed satellite data from Block 5D/5D-1 series, Defense Meteorological Satellite Program. Transmitted selected imagery via Naval Environmental Data Network. Processed vertical temperature profile data and input into upper air analysis. Upgrade software to process sea ice data from NIMBUS-7 Satellite. Completed program to transform satellite grid to mercator projection. Project X0922, Environmental Sensor Assessment - Developed methodology for enhancement of photography and satellite visual and infrared images for synergistic comparisons. Established procedures for processing using Synthetic Aperture Radar data. Task (A): Planning; completed. Task (B): Laboratory Investigations; were initiated for each sensor. Task (C): Aircraft/satellite data acquisition; was completed and evaluation was begun. Synthetic Aperture Radar Data Processor System was procured and is operational. Task (D): Methodology for Evaluation of Military Impact was initiated. Task (E): LANDSAT data were evaluated and report provided to ad hoc committee, evaluating release of LANDSAT capability to the Chinese. White paper on National Oceanographic Satellite System data security was prepared. Project W0943, Automated Environmental Prediction System II - Continued development of modular system software, including Consolidated Communications System, Inter-Computer Network, Command and Control interface, global Optimum Track Ship Routing and tactical probability of detection for ASW. Continued development of automated Optimum Path Aircraft Routing System for Navy aircraft. Implemented several meteorological/oceanographic prediction models.

2. (U) FY 1982 Program: Project W0523, Satellite Data Processing System - Continue development of systems software and applications software for Block 5D2 satellite. Continue software development and implementation of overall system management. Perform technical evaluation of a satellite processing and display system at regional site. Complete satellite data quality control and interactive display device. Continue implementation of software to optimize computer resources. Initiate implementation of Geostationary Operational Environmental Satellite data processing. Project X0922, Environmental Sensor Assessment - Task (B): Laboratory Investigations; complete. Task (C): Aircraft/satellite data evaluation continues. Software development and upgrade continues on Synthetic Aperature Radar Processor system. Task (D): Methodology for evaluation of military impact - parameterize sensor performance potentials for use in future assessments and policy decisions. Conduct mission operations analyses. Project W0943, Automated Environmental Prediction System - Completed risk assessment for Multi-Level/Multi-Access security system. Enhance user interface modules; expand product sets for Command and Control; develop automated system for upgrading graphic products for environmental display devices. Continue to develop methods for quality control. Continue development of software for data base management system.

3. (U) FY 1983 Planned Program: Project W0523, Satellite Data Processing System - Continue development of systems software and applications software for [illegible]-2 satellite. Continue software development and implementation of overall system management.

Program Element: 35111N Title: Weather Service
DoD Mission Area: 420 - Global Military Environ ental Support Budget Activity: 6 - Defensewide Mission Support

Complete test of display device to optimize use of satellite data at user site. Project X0922, Environmental Sensor Assessment - Continue investigations and provide reports as appropriate. Continue to assess synthetic aperature radar data using the Synthetic Aperature Radar Data Processing System. Evaluate LANDSAT-D data as to

4. (U) FY 1984 Planned Program: Project W0523, Satellite Data Processing System - Implement, test and evaluate data received from Block 5D-2 satellite and other satellite sources. Continue development of procedures to receive next gen ation satellite data and begin design of systems software for processing derived oceanographic data. Implement software for special sensor microwave imager data from Defense Meteorological Satellite Program. Continue developing capability to share processed oceanograhic satellite data with the U.S. Air Force and the national civilian satellite system. Develop software to interface regional satellite display capability with global data distribution system.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 35128N
Title: Security and Investigative Activities
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defense Mission Support

(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	689	729	Continuing	Continuing
X0767	Criminal Investigative Support	0	0	689	729	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This project provides unique technical equipment and techniques to the Naval Investigative Service which has the sole responsibility for all counter intelligence and criminal investigative support within the Department of the Navy, worldwide.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete test and evaluation of new suite of Technical Surveillance Countermeasures Receivers. Complete development of a field covert marking system suitable for shipboard use. Continue evaluation of field usable cadaver detection techniques (naval personnel or dependents at overseas bases). Continue development of improved forensic collection techniques for Naval Investigative Agents on ships and overseas bases. 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 result from Congressional action in 1982 (-746) and Navy budget reductions in FY 1983 (-117).

(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	506*	0	746	806	Continuing	Continuing
X0767	Criminal Investigative Support	506*	0	746	806	Continuing	Continuing

*Funded under PE 64702N in FY 1980 and prior.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 35128N
DoD Mission Area: 471 - General Management Support

Title: Security and Investigative Activities
Budget Activity: 6 - Defense Mission Support

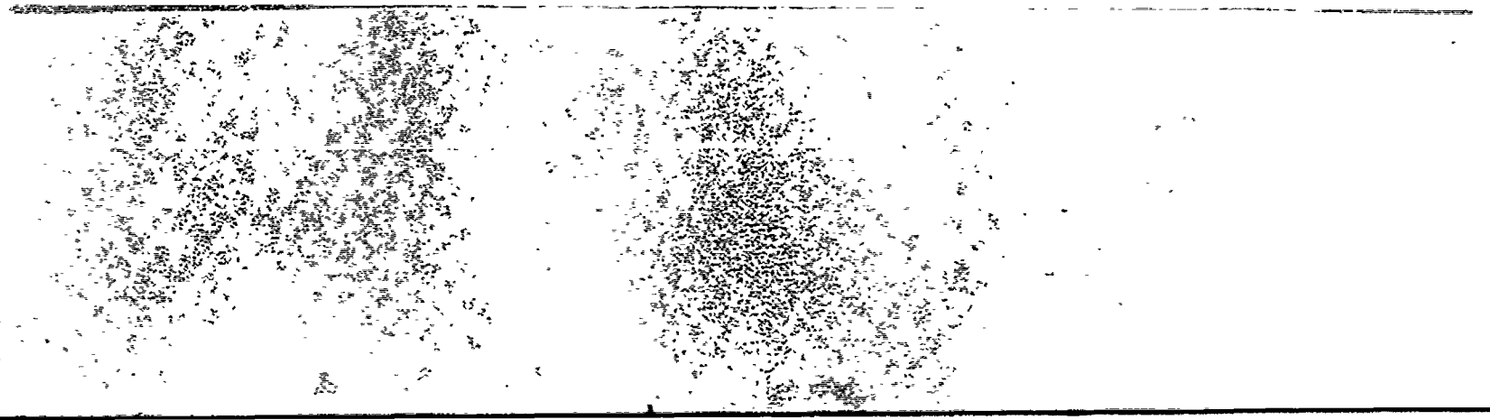
(U) DETAILED BACKGROUND AND DESCRIPTION: Department of Defense directives delegate the responsibility for counterintelligence and criminal investigative support within the naval establishment to the Naval Investigative Service. This program was initially funded in FY 1969 to develop tools with which to counter the threat posed by hostile intelligence and to assist the Naval Investigative Service in the performance of criminal investigations. It has been used to develop equipment and techniques to support Naval Investigative Service programs for technical surveillance countermeasures (detection of clandestine listening devices), counterintelligence and counterespionage operations and investigation of major violations of the Uniform Code of Military Justice such as sabotage (ship and shore), narcotics violations, homicide, theft of government property, etc., worldwide. The types of equipment under development are: sophisticated portable receivers for detection of clandestine listening devices, covert radio frequency signaling devices for use by informants during counterintelligence operations or narcotic buys, personnel tracking devices, covert low light photographic and television equipment, other positive counterintelligence equipment of a highly sensitive nature and other advanced technical investigative aids. Close liaison is maintained with the Federal Bureau of Investigation, Central Intelligence Agency, National Security Agency, and other agencies to insure maximum exchange of new developments and non-duplication of effort.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-house: Naval Ocean Systems Center, San Diego, CA. Contractors: General Research Corp. (SWL Division), McLean, VA; Missouri Research Labs, Albuquerque, NM.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Developed a suite of covert technical surveillance countermeasures receivers, battery or AC-operated, highly portable with a wide frequency range. Developed a family of covert audio monitoring devices for use in counterintelligence and criminal investigations. Research and development of devices to solve a multitude of problems concerning marking and tracking of persons and items. Advanced the Naval Investigative Service ability to perform long range extended period optical and other covert sensor surveillance of persons and objects. Developed and tested evidence collection and narcotic identification kits for use by Naval Investigative Service agents ashore and afloat. Completed development of techniques for a spread spectrum detection device. Continued development of a device for covert determination of unauthorized copying of classified documents. Continued exploration of more accurate and easily used field tests for narcotics and dangerous drugs. Continued program for improved evidence collection techniques involving detection and identification of accelerant vapors at arson scenes, suspect identification and others. Conducted initial test and evaluation of new technical surveillance countermeasures. Initiated evaluation of field terminal communications equipment.



Program Element: 35128N
Title: Security and Investigative Activities
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defense Mission Support

2. (U) FY 1982 Program: (As program was not funded in FY 1981 or FY 1982 effort slipped two years.) Continue development of new technical surveillance countermeasures equipment. Continue development of optical investigative aids and shipboard theft detection sensors, continue improvement of forensic science techniques for use by Naval Investigative Service agents.

3. (U) FY 1983 Planned Program: Complete test and evaluation of new suite of Technical Surveillance Countermeasures Receivers, complete development of a field covert marking system suitable for shipboard use, continue evaluation of field usable cadaver detection techniques (naval personnel or dependents at overseas bases), and continue development of improved forensic collection techniques for Naval Investigative Agents on ships and overseas bases.

4. (U) FY 1984 Planned Program: Continue improvement of evidence collection techniques for problems unique to shipboard and overseas crime scene locations. Initiate program to determine clandestine eavesdropping threat to naval installations overseas and methods to combat that threat. Commence study of Naval Investigative Service law enforcement communications systems with a view towards improved efficiency, reduction of manpower requirements and obtaining access to other law enforcement agencies and their data bases at the federal and local levels.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 35160N
Title: Defense Meteorological Satellite Program
DoD Mission Area: 420 - Global Military Environmental Support
Budget Activity: 6 - Defensewide Mission Support

(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	1,901	1,350	1,316	1,065	Continuing	Continuing
W0524	Defense Meteorological Satellite Program - Navy Support	1,901	1,350	1,316	1,065	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element includes equipment, facilities and costs required to develop and operate the Navy segment of the Defense Meteorological Satellite Program.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Integrate microwave radiometer into 5D2 spacecraft and conduct preflight testing. Collect data and establish baseline for post launch validation and evaluation of microwave radiometer. Commence development to modernize the SMQ-10 (Meteorological Satellite Data Receiver Recorder). 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 follow: The increase of 85 in FY 1981 results from reprogramming of 100 from Program Element 63207N/Project W1399 to develop ways of measuring sea surface temperature by microwave imager and a reduction of 15 during development of the FY 1981 supplemental budget. The decrease of 18 in F. 1982 results from development of the FY 1982 budget amendment. The decrease of 176 in FY 1983 results from revised escalation rates (-48), pay increases (+2), and 130 transferred to PE 63704N to support development of techniques to improve interpretation of oceanographic features from satellite data.

(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	2,468	1,816	1,368	1,492	Continuing	Continuing
W0524	Defense Meteorological Satellite Program - Navy Support	2,468	1,816	1,368	1,492	Continuing	Continuing

Program Element: 35160N Title: Defense Meteorological Satellite Program
DoD Mission Area: 420 - Global Military Environmental Support Budget Activity: 6 - Defensewide Mission Support

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
OPN Shipboard Satellite Readout Equipment	0	0	3,938	7,347	20,169	57,597
(Quantity)						
Laser Dry Processor	(0)	(0)	(0)	(0)	(14)	(14)
Shipboard Terminal Systems	(0)	(0)	(1)	(2)	(2)	(13)
WPN Defense Meteorological System Program - Navy Support	0	3,800	0	(0)	19,400	23,200
(Quantity)						
Microwave Radiometer	(0)	(1)	(0)	(0)	(3)	(4)

Program Element: 35160N
Title: Defense Meteorological Satellite Program
DoD Mission Area: 420 - Global Military Environmental Support
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Navy environmental support services are dependent upon the development and utilization of meteorological satellite capabilities and associated data processing and display systems. This program provides a continuing research and development effort to insure that unique Navy requirements are satisfied by the Defense Meteorological Satellite Program. As directed by the Memorandum of Agreement on the Joint-Service Management and Operations of the Defense Systems Applications Program, each service is responsible for the specific requirements placed on the system by that particular service. The Defense Meteorological Satellite Program satellite system is a constellation of two sun-synchronous satellites orbiting at 450 nautical miles with a sensor complement capable of providing a worldwide weather picture at 1/3 n.m. resolution both day and night. The system operates in both a real-time mode for tactical applications and in a store and transmit mode which is utilized at the Fleet Numerical Oceanography Center for forecasting and strategic application. The Navy's most important unique requirement for the system is to receive and process high resolution data aboard ship. The relatively low power of the satellite transmitter and the severe Radio Frequency Interference aboard ship necessitate a unique antenna and data processing system. The shipboard receiving system consists of two 6-foot antennas cantilevered from the sides of the ship (port and starboard), which are computer controlled to act as a single unit. Eight racks of below decks electronics receive and process the Defense Meteorological Satellite Program data. The basic development of the receiving equipment was completed in FY 1978 under W0522, Shipboard Satellite Readout Equipment. All future development and modifications will be funded under this project W0524.

(U) RELATED ACTIVITIES: Program Element 35160F, Air Force Defense Meteorological Satellite Program; Program Element 35111N, Weather Service, Project W0523, Satellite Data Processing System.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; Navy Space Systems Activity, Los Angeles, CA
Contractors: Harris Corp., Melbourne, FL; RCA, Princeton, NJ; Hughes Aircraft Co., Los Angeles, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PRORAMS:

1. (U) FY 1981 and Prior Accomplishments: Under Project W0522, Shipboard Satellite Readout Equipment, both a feasibility and prototype model of the shipboard readout terminal was designed, developed and fabricated. Technical Evaluation and Operational Evaluation were completed and Approval for Service Use was granted on 28 April 1981. Completed development and test of a Laser/printer data display which will be utilized in future production models. Terminated Project W0522, Shipboard Satellite Readout Equipment and transferred efforts to this project. W0524, Defense Meteorological Satellite Program: Completed studies for a microwave radiometer to be developed in conjunction with the Air Force and awarded a contract to Hughes Aircraft for hardware development.

2. (U) FY 1982 Program: Accept delivery of the Hughes Aircraft developed microwave radiometer including software for ground system processing. Modify software to extract sea-surface temperature. Develop plan and commence data collection to establish baseline for post launch validation and evaluation of the microwave radiometer. Conduct study to define modernization of SMQ-10.

Program Element: 35160N
Title: Defense Meteorological Satellite Program
DoD Mission Area: 420 - Global Military Environmental Support
Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 Planned Program: Integrate microwave radiometer into 5D2 spacecraft and conduct preflight testing. Continue development of baseline data for post launch validation and evaluation. Commence developmental effort to modernize the SMQ-10.

4. (U) FY 1984 Planned Program: Launch microwave radiometer and commence validation and evaluation. Continue modernization of SMQ-10 (Meteorological Satellite Data Receiver-Recorder).

5. (U) Program to Completion: Evaluate the performance of the microwave radiometer and incorporate data into Fleet Numerical Oceanography Center operations. Complete modernization of the SMQ-10. This is a continuing program which provides Navy research and development support of the Defense Meteorological Satellite Program.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64208N
Title: Range Instrumentation and Systems Development
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

(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	13,276	10,317	12,392	17,235	Continuing	Continuing
W0604	Training Range and Instrumentation Development	2,324	3,879	5,638	9,138	Continuing	Continuing
W0881	Test and Evaluation Range Instrumentation	2,401	3,608	4,653	6,357	Continuing	Continuing
S0990	Mobile Tracking Range	4,066	2,315	0	0	0	11,367
X1048	Wide Area Active Surveillance Radar	4,485	515	2,101	1,740	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Requirements for new and improved range instrumentation and systems to meet the needs of Major Range Test Facility Base and Fleet Training Ranges are developed within this program element. Training Range Instrumentation Development (W0604) provides the necessary funding for the development of Fleet Training Range instrumentation and systems necessary to meet the training requirements of new production weapon systems recently introduced into the fleet. Test and Evaluation Range Instrumentation (W0881) funding initiates development of scientific and technical test instrumentation and systems required by more than one Major Range and Test Facility Base Activity to conduct developmental and operational test and evaluation on Navy weapons systems undergoing research and development. The Mobile Tracking Range (S0990) is a complete, self-contained, semi-permanent and movable range under development to provide a capability for the conduct of fleet Anti-Submarine Warfare and test and evaluation exercises in a realistic open ocean environment. The Wide Area Action Surveillance Radar (X1048) is a land-based multifunction phased array surveillance system under development to eliminate existing range control and safety problems directly involving ships and aircraft undergoing Fleet Readiness Training, and to support weapon systems test and evaluation at the Atlantic Fleet Weapons Training Facility.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Development efforts to be accomplished during this funding period within the projects in this program element are: the integration, installation and testing of the Multiple Target Instrumentation Radar; to complete development of the first two frequency bands of the Threat Radar Simulator; to determine requirements for a Deception Jammer Simulator and for a Communications Navigation Identification Jammer/Simulator; continue development of improved telemetry capability for six Fleet telemetry stations; complete the development and test of a prototype airborne telemetry relay pod for over-the-horizon telemetry acquisition for HARPOON and TOMAHAWK Training Range and Instrumentation Development (W0604); to complete implementation of secure telemetry decryption capability at the major ranges and provide technical and security assistance to weapons and ranges requiring secure telemetry; and to provide initial specifications and start fabrication of prototype open ocean missile exercises target control system and to complete Surface Target Control System Development in the Test

and Evaluation Instrumentation (W0881); the Mobile Tracking Range Project (S0990) is cancelled; and to provide factory engineering level support for the Wide Area Active Surveillance and Radar during its first year of operation and develop automatic test equipment for maintenance. 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 those shown in this Descriptive Summary are as follows: +860 in FY 1981 results from refined cost estimates including inflation; -6,742 in FY 1982 as a result of cancellation of the Mobile Tracking Range (-1,937), mathematical error (-4,500 (PE total should have been 12,559 vice 17,059)), and refined cost estimates including inflation; -4,594 in FY 1983 in FY 1983 as a result of the cancellation of the Mobile Tracking Range (-4,148) and refined cost estimates including inflation.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12,935	12,416	17,059	16,986	Continuing	Continuing
W0604	Training Range and Instrumentation Development	3,121	1,044	4,046	5,138	Continuing	Continuing
W0881	Test and Evaluation Range Instrumentation Development	1,065	3,132	3,710	5,305	Continuing	Continuing
S0990	Mobile Tracking Range	2,949	3,704	4,252*	4,148	0	17,090
X1048	Wide Area Active Surveillance Radar	5,800	4,536	551	2,395	Continuing	Continuing

* Justification Book shows $8,752 for Project S0990-AS, Mobile Tracking Range, in FY 1982, $4,500 of which was transferred from APN to RDT&E for the Integrated Air Warfare Training Center. Due to administrative error these funds were allocated to this Program Element vice 24161N, Integrated Air Warfare Training Center (Fallon). Justification for these funds is provided under Program Element 24161N. Action is in process to transfer the $4,500.

(U) OTHER APPROPRIATIONS FUND: (Dollars in Thousands)

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	Other Procurement, Navy	13,000	11,800	4,000	5,400	Continuing	Continuing
	Aircraft Procurement, Navy	0	0	0	1,800	Continuing	Continuing

Program Element: 64208N
DoD Mission Area: 454 - Other Test and Evaluation Support

Title: Range Instrumentation and Systems Development
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: New and improved range instrumentation must be developed for Major Range and Test Facilities Base Activities and Fleet Training Ranges to accurately, effectively, and economically evaluate newly emerging weapon systems now under development for future introduction into the fleet, and to provide a realistic training environment where fleet performance can be evaluated. Current range instrumentation has not kept pace with the advanced weapons systems technology and fleet readiness needs. The Navy is developing weapon systems for the 1990's and year 2000 and verifying their military worth and performance with antiquated range instrumentation. Fleet readiness training is being conducted on training ranges where evaluation of fleet readiness is being made with similar obsolescent equipment. This program element, with the four projects in it, will provide more modern, effective and efficient range instrumentation to meet the advanced technology needs of the Research, Development, Test and Evaluation community and the fleet. The improvements in test data acquisition and analysis provided by the instrumentation equipment under development will enable reductions in test programs. Fleet readiness training instrumentation in development will enable training in environments that realistically represent the expected operational environment. The Training Range Instrumentation Development Project (W0604) is developing the Multiple-Target Instrumentation Radar which will track 16 targets simultaneously with extreme accuracy and will vastly improve Anti-Air Warfare and tactical air warfare weapon system development testing, as well as support complete fleet exercises; this project moves to W0881 in FY 1982. Developments to meet Electronic Warfare training range requirements include skin return simulators, generic threat emitters and jammers. Several telemetry developments under this project will greatly enhance missile systems data retrieval, including immediate requirements for over-the-horizon telemetry data collection. The Test and Evaluation Range Instrumentation Development Project (W0881) is developing a secure telemetry interface system that will integrate telemetry encryption/decryption devices developed by NSA with existing and upcoming telemetry systems thereby preventing the collection of sensitive telemetry test and training data by foreign intelligence units. Necessary background studies have been completed and full service test program with Army and Air Force participation was commenced in FY 1979. Implementation of telemetry decryption capability at the Major Ranges is planned for FY 1981 and 1982. Development of new low cost target command/control systems will permit open ocean missile firing exercises involving extended ranges and surface targets. The Wide Area Active Surveillance Radar Project (X1048) will provide a highly accurate, multi-function phased array radar that will provide 3D tracking of 50 targets from altitudes of 500 to 100,000 feet, at ranges of 8 to 250 nm and over an azimuth of 120 degrees. This system will eliminate serious handicaps in the conduct of realistic exercises with a reasonably high level of safety. These handicaps are lack of accurate and timely 3D tracking information on airborne targets; insufficient detection capability to observe the path of high velocity targets: no automatic detection and tracking; poor target detection and identification; and limited capability in an electronics countermeasures environment. The Mobile Tracking Range Project (S0990) has been developing a mobile underwater, surface, and in air tracking range capability that would greatly reduce the frequency that ships in the Atlantic and Pacific must travel to the present fixed tracking ranges; would permit at-sea Operational Test and Evaluation and training in support of submarine and anti-submarine warfare; would allow testing and training under the wide range of at-sea environmental conditions existing at various open-ocean geographic locations; and would reduce the artificial testing and training constraints imposed by the small fixed tracking ranges. Funding limitations have resulted in cancellation of this project.

Program Element: 64208N
DoD Mission Area: 454 - Other Test and Evaluation Support

Title: Range Instrumentation and Systems Development
Budget Activity: 6 - Defensewide Mission Support

(U) RELATED ACTIVITIES: Program Element 65864N, Test and Evaluation Support; Program Element 63852N, Atlantic Undersea Test and Evaluation Center; and Program Element 65859N, Mobile Sea Range will use the developments that are provided by Program Element 64208N, Range Instrumentation and Systems Development, or support related programs which also develop test range capabilities unique to a particular Test and Evaluation facility.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA; Naval Research Laboratory, Washington, DC; Naval Air Test Center, Patuxent River, MD; Naval Undersea Systems Center, Newport, RI., Naval Air Development Center, Warminster, PA; and Fleet Analysis Center, Corona, CA. Contractors: Stanford Research Institute, Menlo Park, CA; Raytheon Company, Wayland, MA; Bunker Ramo, Westlake, CA; MITRE Corporation, Washington, DC.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The system design, majority of the operational software, the signal processor, display and control console, beam steering unit, and receiver/exciter, phased array antenna, pedestal, and partial fabrication of the transmitter for the Multiple Target Instrumentation Radar was completed. Developed pod/aircraft interface of compact telemetry receiver and developed small pod analog tape recorder for use in telemetry relay pods. Completed secure telemetry studies and demonstration with actual firings of SIDEWINDER missiles. Completed performance requirements investigation to delineate Navy requirement for the Electronic Warfare Response Monitor for surface electronic warfare training. A major computer system and peripherals for radar control was purchased and development of system and all subsystems and software were completed, factory tested and shipped to the Atlantic Fleet Weapons Training Facility to begin installation. Procured components and commenced development of the receiver/exciter, beam steering unit, signal processors and the radar controller. Completed initial feasibility studies for the Mobile Tracking Range and awarded contract for in-water system development to Bunker Ramo. Completed requirements definition, and initiated specification preparation of the surface Target Control System. Initiated Vega Tracking system modification to provide interim control system.

2. (U) FY 1982 Program: Complete fabrication of the phased array antenna, pedestal, and transmitter; complete operational software, develop system calibration capabilities and integrate, functionally test and demonstrate at the contractors facility the Multiple-Target Instrumentation Radar; move to a test and evaluation range and begin test and evaluation. Provide investigations and analysis of telemetry functions needed to upgrade telemetry stations and pods to support development, test, and evaluation and Fleet training requirements. Complete implementation of secure telemetry decryption capability at selected ranges with final capability provided in FY 1983. Provide secure telemetry technical support to weapons projects requiring secure telemetry. Complete development of Navy Electronic Warfare Response Monitor definition fo aircrew electronic warfare training; and determine cost to modify USAF AN/MSR in FY 1986. Initiate the development of a generic Threat Radar Simulator system which will enable the Fleet Training Ranges to provide a realistic electronic warfare environment for the recently introduced electronic warfare suites, e.g., the AN/SLQ-32 and AN/SLQ-17. Determine the outyear requirements for aircrew electronic warfare training at the 2D2

electronic warfare training ranges. FY 1982 funds are necessary to close out the Mobile Tracking Range Project. The Wide Area Active Surveillance Radar will be installed in government furnished facilities during the period October through December of FY 1982; and will be tested, spared, documentation provided, and the need for automatic test equipment for maintenance evaluated, during the remainder of FY 1982. Begin fabrication of the engineering development model of the Surface Target Control system. Complete Vega Tracking System modification for at sea use in controlling missile targets.

3. (U) FY 1983 Planned Program: Install and conduct test and evaluation of the Multiple Target Instrumentation Radar. Initiate development of clutter processing capability and other improvements for Multiple Target Instrumentation Radar. Complete prototype and testing of airborne telemetry relay pod for over-the-horizon telemetry acquisition from HARPOON and TOMAHAWK missiles and combat air patrol operations during open-ocean or Mobile Sea Range exercises. Continue development of improvements for six Fleet telemetry stations and develop pod tape recorder for high density digital recordings. Complete implementation of secure telemetry decryption capability at the remaining major ranges. Coordinate new secure telemetry developments by National Security Agency with Navy requirements. Complete development of first two frequency bands of the Threat Radar Simulator. Determine the requirements for a Deception Jammer Simulator to provide electronic counter-countermeasures training for Navy radar operators. Determine the requirements for a Communications, Navigation, Indentification Jammer/Simulator to provide electronic warfare training for Fleet operations at the Fleet Training Ranges. Test and evaluate Vega command-capable modifications, and make procurement decision. Complete Surface Target Control System development, and conduct evaluation. Start fabrication of prototype open-ocean missile target control systems. Develop automatic test equipment and retain factory support during first year of Wide Area Active Surveillance Radar operation. Develop bread-board system tests and prepare procurement specification for the alternate frequency phase coded processor for Underwater Tracking Range at Pacific Missile Range Facility. Develop specifications for advanced Electronic Warfare threat simulators for the 2D2 Electronic Warfare Training Ranges. Determine the requirements for a Mid-Atlantic Electronic Warfare Site.

4. (U) FY 1984 Planned Program: Complete the development of the Threat Radar Simulator. Generate a specification for a Skin Return Simulator which will improve/enhance the effectiveness of the electronic counter-countermeasures training that radar operators receive from the Noise Jammer Simulators located at Fleet Training Ranges. Complete development of phased-array multiple beam auto-tracking telemetry antenna for airborne pods, and continue development of ground-based phase array, complete development of airborne scanning telemetry receiver for pod use, publish final secure telemetry user's manual, complete fabrication of open-ocean missile target control prototypes, and initiate project to determine target position, velocity and acceleration in real-time using Target Motion Resolution techniques to modify existing radars. Continue secure telemetry coordination with National Security Agency and evaluation of new encryption equipment. Complete development of site peculiar interface for the Multiple-Target Instrumentation Radar and conduct additional test and evaluation of the Multiple-Target Instrumentation Radar at selected test and evaluation facilities. Develop specifications for Electronic Warfare Threat Simulators for the Mid-Atlantic Electronic Warfare Site.

Program Element: 64208N
Title: Range Instrumentation and Systems Development
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

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

6. (U) Milestones: Not applicable.

Project: W0604 Title: Training Range and Instrumentation Development
Program Element: 64208N Title: Range Instrumentation and Systems Development
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The Training Range and Instrumentation Project develops specialized Range Instrumentation Systems to maximize Fleet readiness training effectiveness, and minimize instrumentation requirements while reducing operating maintenance costs and manpower. The project supports a number of tasks. In FY 1982, Multiple Target Instrumentation Radar transfers from this project to project W0881 to permit application of Multiple Target Instrumentation Radar technology to satisfy test and evaluation range requirements. The areas where significant increases in funding occur for FY 1982 compared to FY 1981 are the electronic warfare systems and telemetry development and tests. The Electronic Warfare Systems initiative include: generation of Engineering Change Proposal requirements to modify the USAF AN/MSR response monitor for both surface and aircrew electronic warfare training ranges, development of a Threat Radar Simulator, determination of upgrade requirements for the threat platform simulators located at Atlantic Fleet Weapons Training Facility, performance of a technology survey and requirements definition for a Skin Return Simulator, and generation of scenarios for the Noise Jammer Simulator from intelligence data. This effort will also be used to form the basis for follow on research and development efforts and provide specialized technical evaluations and develop specifications for out year Other Procurement, Navy procurements. During FY 1982, this effort will determine the computer modernization design requirements for both the Atlantic Fleet Weapons Training Facility and Pacific Missile Range Facility, to provide as much commonality in hardware, configuration and software as possible. The Telemetry development and test efforts will complement other telemetry improvement programs for the development or open ocean instrumentation pods to support combat air patrol and for telemetry relay/record pods to support missile training. A technical design and study will be conducted to determine the utility of ground based phased array antennas for telemetry. The objective is to identify upgrade/modernization requirements to improve accuracy, reduce data turn around time, and Operation and Maintenance, Navy costs. Engineering and development models will be constructed with evaluation/optomization continuing through FY 1984. The small missile instrumentation package development will provide a low cost Sidewinder size package compatible with the requirements of the Extended Area Test System and the Mobile Sea Range. A start in FY 1982 is required in order to support production in FY 1985.

(U) RELATED ACTIVITIES: Electronic Warfare range efforts will enable the Fleet to exercise surface and airborne radar and electronic warfare systems. The Multiple Target Instrumentation Radar transfers from Project W0604 to W0881 to permit application of the Multiple Target Instrumentation Radar technology to satisfy test and evaluation range requirements. The development of requirements for the Small Missile Instrumentation Package to be compatible with the Mobile Sea Range (PE 65859N, Project W0169) and the Extended Area Test System. Telemetry pod development will support open ocean and Mobile Sea Range exercises (W0881 and W0169). Assists in the development of a high accuracy radar capable of simultaneously tracking several objects/vehicles; replaces single object tracking radars at test and evaluation and training ranges to achieve an operations and maintenance cost reduction (W0881). Contributes to the design/development of an instrumentation system and integrates existing assets at the Naval Air

Project: W0604 Title: Training Range and Instrumentation Development
Program Element: 64208N Title: Range Instrumentation and Systems Development
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

Station, Fallon, NV and to provide simulation of a realistic combat environment for individual aircrews for full carrier airwing contingent training in weapons delivery, electronic warfare, and Aircrew Combat Maneuvering Range (PE 24571, W0431, and W1414).

(U) WORK PERFORMED BY: In-House: Fleet Anlaysis Center, Corona, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Weapons Center, China Lake, CA. Contractor: Unknown (Competitive procurement planned.)

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The system design, majority of the operational software, the signal processor, display and control console, beam steering unit, and receiver/exciter, phased array antenna, pedestal, and partial fabrication of the transmitter for the Multiple Target Instrumentation Radar was completed. Developed pod/aircraft interface of compact telemetry receiver and developed small pod analog tape recorder for use in telemetry relay pods. Completed performance requirements investigation to delineate Navy requirements for the Electronic Warfare Response Monitor for surface electronic warfare training.

2. (U) FY 1982 Program: Provide investigations and analysis of telemetry functions needed to upgrade telemetry stations and pods to support development, test, and evaluation and Fleet training requirements. Complete development of Naval Electronic Warfare Response Monitor definition for aircrew electronic warfare training; and determine cost to modify USAF AN/MSR Response Monitor in FY 1986. Initiate the development of a generic Threat Radar Simulator System which will enable the Fleet Training Ranges to provide a realistic electronic warfare environment for the recently introduced electronic warfare suites, e.g., the AN/SLQ-32 and AN/SLQ-17. Determine the outyear requirements for aircrew electronic warfare training at the 2D2 electronic warfare training ranges. During FY-82 the range requirement efforts will determine the computer modernization design requirements for both the Atlantic Fleet Weapons Training Facility and the Pacific Missile Range Facility to provide as much commonality in hardware, configuration, and software as possible. Initiate development of requirements for Small Missile Instrumentation Package compatible with the Extended Area Test System and Mobile Sea Range.

3. (U) FY 1983 Planned Program: Complete prototype and testing of airborne telemetry relay pod for over the horizon telemetry acquisition from HARPOON and TOMAHAWK missiles. Continue development of improvements for six Fleet telemetry stations and develop pod tape recorder for high density digital recordings. Complete development of first two frequency bands of the Threat Radar Simulator. Determine the requirements for a Deception Jammer Simulator to provide electronic counter-countermeasures training for Navy radar operators. Determine the requirement for a Communications, Navigation, Identification Jammer/Simulator to provide electronic warfare training for Fleet operators at the Fleet Training Ranges. Develop specifications for advanced electronic warfare threat simulators for the 2D2 Electronic Warfare Training Ranges. Determine the requirements for a Mid-Atlantic Electronic Warfare site. Continue initial development phase for Small Missile Instrumentation Package.

Project: W0604 Title: Training Range and Instrumentation Development
Program Element: 64208N Title: Range Instrumentation and Systems Development
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

4. (U) FY 1984 Planned Program: Complete the development of the Threat Radar Simulator. Generate a specification for a Skin Return Simulator which will improve/enhance the effectiveness of the electronic counter-countermeasures training that radar operators receive from the Noise Jammer Simulators located at Fleet Training Ranges. Develop specifications for Electronic Warfare Simulators for the Mid-Atlantic Electronic Warfare Range. Complete development of a phased array multiple beam auto tracking telemetry antenna for airborne pods, and continue development of ground based phased array, complete development of airborne scanning telemetry receiver for pod use; and continue development of Small Missile Instrumentation Package.

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
W0604	Training Range and Instrumentation Development	2,324	3,879	5,638	9,138	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64258N
Title: Targets Systems Development
DoD Mission Area: 452 Aerial Targets
Budget Activity: 6 - Defensewide Mission Support

(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	43,045	58,803	43,901	48,112	Continuing	Continuing
W0609	Aerial Target Systems Development	5,201	10,760	10,179	13,699	Continuing	Continuing
W0610	Weapon System T&E Targets	15,707	24,067	26,685	28,261	Continuing	Continuing
W0611	Supersonic Low Altitude Target Development	17,395	18,100	0	0	0	84,303
W0612	Surface Target Systems Development	552	1,294	2,314	1,340	Continuing	Continuing
W0613	Target Auxiliary Systems Development	4,190	4,582	4,723	4,812	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Threat representative targets are required to evaluate Navy weapon systems performance throughout their life cycle, including developmental testing, realistic operational evaluation and effective fleet training. This program element provides for engineering development of target systems and associated electronic and infrared subsystems necessary to duplicate or simulate significant threat characteristics, radar cross section, infrared signature, Radio Frequency Emissions, scoring, and control systems. Conversion of out-of-service or phased-out aircraft and missile systems to targets has proven to be a cost effective method of providing full-scale targets for weapon system test and evaluation requirements. Original systems must be reconfigured to satisfy drone safety, scoring and operational requirements.

(U) BASIS FOR 1983 RDT&E REQUEST: Continue development of the BQM PF and FIREBOLT targets. Commence development of replacement for QF-86 target and AQM target product improvement program. Install and test a G-band control system in surface targets. Continue development of active augmentation systems for surface targets. Continue conversion of full-scale aircraft and missiles to maintain an inventory of targets to meet weapon systems test and evaluation requirements. Continue development of target auxiliary systems for full scale and subscale targets. Complete integration of auxiliary systems into tow targets. 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 as follows: +425 in FY 1981 and -3186 in FY 1982. The additional funds in FY 1981, provided by Navy reprogramming, were used to incorporate changes into the AQM-37A target to support

Program Element: 64258N
DoD Mission Area: 452 Aerial Targets

Title: Targets Systems Development
Budget Activity: 6 - Defensewide Mission Support

Standard Missile-2 missile test and evaluation. Interproject transfers were made to provide additional funds for FIREBRAND development. The reduction in FY 1982 funding is due to Congressional budget reductions (2000) and to DoD reduction during budget development (1186). The reductions will be reflected in the procurement of fewer VANDAL and subscale targets for test and evaluation use and in the termination of the FIREBRAND development which is also reflected in reduction of outyear funding. Other minor changes in the individual project funding profiles result from refined estimates of program costs including inflation adjustments.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	21,519	42,620	61,989	TBD	TBD	TBD
W0609	Aerial Target Systems Development	1,200	5,132	10,860	TBD	TBD	TBD
W0610	Weapon System T&E Targets	2,228	16,414	26,167	TBD	TBD	TBD
W0611	Cruise Missile Target Development	15,201	16,082	18,949	TBD	TBD	TBD
W0612	Surface Target Systems Development	501	552	1,294	TBD	TBD	TBD
W0613	Target Auxiliary Systems Development	2,389	4,440	4,719	TBD	TBD	TBD
W0875	Aerial Target Fund*	(6,500)*	*	*	TBD	TBD	TBD

* Non-add. This project was funded under Program Element 64201N, Aerial Target Fund FY 1980 and prior. That Program Element was cancelled and incorporated into Project W0610-SL, Weapon System T&E Targets in FY 1981 and subsequent years.

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Weapons Procurement, Navy	38,500	70,000	76,600	96,200	Continuing	Continuing
Other Procurement, Navy	3,381	0	1,425	3,403	Continuing	Continuing
Operation and Maintenance, Navy	4,050	4,788	4,528	5,071	Continuing	Continuing

Program Element: 64258N
DoD Mission Area: 452 - Aerial Targets

Title: Targets Systems Development
Budget Activity: 6 - Defensewide Mission Support

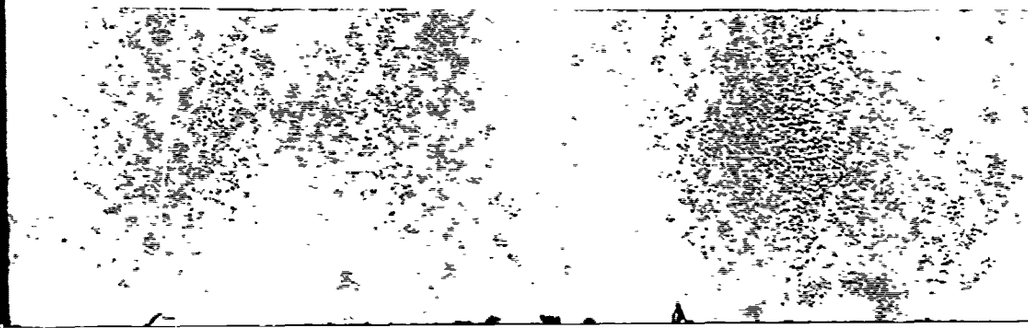
(U) DETAILED BACKGROUND AND DESCRIPTION: The purpose of the Target System Development Program is to provide adequate simulation of emerging threats for weapon systems test and evaluation and a cost-effective mix of targets for fleet readiness training. Both areas require continuing development effort to meet new Test and Evaluation requirements and evolving training scenarios such as the open ocean missile exercises. Two basic types of targets are included: 1) Aerial targets which include full scale, subscale and tow targets; 2) Surface targets which include remote controlled boats, ship hulks and the QLT-1C Mobile Land Target. Associated with the above projects is the development of, and integration of, Target Auxiliary Systems to enhance infrared and radio frequency signatures, simulate electronic countermeasures and active threat seeker characteristics, and provide miss distance information and drone control. The full scale targets include droned aircraft (QF-4B and QF-86) and missiles (VANDAL). Subscale targets include BQM-34A/S, BQM-34E/T, AQM-37A, and M/BQM-74C. All of the above targets except the AQM-37A, and VANDAL are recoverable and reusable. Tow targets include the TDU-34A General Purpose Tow Target, TDU-32 Aerial Banners and the aircraft mounted A/A 47U-3 heavy duty and A/A 47U-4 carrier qualified reeling machine launcher systems. Project W0610 Weapon Systems Test and Evaluation Targets provides for conversion of full-scale aircraft and missiles and procurement of subscale targets and target auxiliary equipment used exclusively for weapon systems test and evaluation.

(U) RELATED ACTIVITIES: Test and Evaluation of developmental weapon systems and fleet operational training.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Point Mugu, CA; Contractors: Bendix Corp., Mishawaka, IN; Teledyne Ryan, San Diego, CA: Beech Aircraft Wichita, NE, PDA Santa Ana, CA, Motorola, Phoenix, AZ, Raytheon, Boston, MA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: BQM-34A/S, MQM-74C, AQM-37A, targets and BQM-34E/T, subscale targets are in operational use. Drone conversion development of the QF-4, QF-86H and QF-86F full scale targets was completed and these targets are in operation. A/A47U-3 and -4 tow reels and TDU-32 and TDU-34 tow targets are in production. AN/DPT-1 and AN/DPT-2 seeker simulators engineering development was completed. AN/DLQ-3B countermeasures simulator is in production and the AN/DLQ-5 miniaturized version for subscale targets engineering development continue. The FIREBRAND Cruise Missile Target engineering development effort continued. VANDAL development completed and performance expanded to 60,000 feet. All attitude QF-4B control system development continued. The prime contract for the Engineering Development of the FIREBRAND Cruise Missile Target was awarded in May 1977. Wind tunnel testing, engine development tests, and booster development test, were completed. The system hardware Critical Design Review has been conducted. Fabrication of flight test vehicles and ground support equipment has been initiated. The seaborne target G-band command/control system development has been initiated.



Program Element: 64258N
DoD Mission Area: 452 - Aerial Targets

Title: Targets Systems Development
Budget Activity: 6 - Defensewide Mission Support

2. (U) FY 1982 Program: Complete flight test of QF-4 all attitude control system. Design modifications of AGM-37 for higher altitude, high speed operations. Integrate target auxiliary equipments into TDU-34 tow targets. Convert thirteen F-86 and F-4 aircraft to targets. Procure twenty-three VANDAL targets, twelve Air Force FIREBOLT targets and various target auxiliary equipments to support weapon system test and evaluations. Modify thirty-four AGM-37A targets to suppport Standard Missile-2 missile testing. Terminate the FIREBRAND development. Continue development of the seaborne target G-band control system and procure Floating Automatic Scorable Target preproduction models. Evaluate the bullet quadrant scorer, and continue development of target augmentation devices.

3. (U) FY 1983 Planned Program: Initiate definition of QF-86 replacement. Conduct fli[illegible]t of modified AQM-37. Initiate development of AQM product improvements. Continue development of BQM target product i[illegible]. Convert thirteen F-86 and four F-4 aircraft to targets. Procure sixteen VANDAL targets, target auxiliary equipments for weapons system test and evaluation. Complete Floating Automatic Scorable Target development and G-band control system development. Fabricate range gate scorer prototype. Continue target augmentation device development.

4. (U) FY 1984 Planned Program: Continue AQM and BQM target product improvement development. Initiate design of modification to aircraft to replace QF-86. Convert thirteen F-86 and F-4 aircraft to targets. Procure ten AQM-37A and thirty subscale subsonic targets and various target auxiliary equipments for weapons system test and evaluation. Initiate development of seaborne tow target. Continue target auxiliary equipment development.

5. (U) Program to Completion: The overall Target System Development program is a continuing program to respond to emerging threats and changing characteristics of current threats.

6. (U) Milestones: Not applicable.

Project Number: WQ609 Title: Aerial Target Systems Development
Program Element: 64258N Title: Target Systems Development
DoD Mission Area: 452 - Aerial Targets Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The purpose of the Aerial Target System Development project is to provide realistic simulation of existing and emerging threats for weapon systems test and evaluation and to ensure that an optimum mix of targets is available to meet fleet training and readiness requirements as specified in OR WO3TW. A continuing development effort is essential to meet new T&E requirements and expanding scenarios such as Mobile Sea Range and Open-Ocean Missile Exercises. Three basic target categories are included: Full scale, subscale and tow targets. The full scale targets, consisting of droned surplus aircraft and missiles, include the QF-86, and QF-4B/N and the MQM-8G (VANDAL) missiles. Subscale targets encompasses the BQM-34A/S, BQM-34E/T, AQM-34A and the B/MQM-74C. The tow targets include the TDU-32 Banner, and the TDU-34 Navy Standard Tow Target. Tow target systems also include the A/A47U-3 heavy duty and A/A-47U-4 carrier certified reeling machines for tow target launch and recovery. All of the above target systems are recoverable and reusable except the AQM-37A and the MQM-8G (VANDAL).

(U) RELATED ACTIVITIES: Test and evaluation of developmental weapon systems and fleet operational training. Weapon systems currently in service and requiring training targets, AIM-7E/F, AIM-9H/L/M, AIM-54A, Basic Point Defense Tarter, Terrier, Standard Missile 1, Close-in Weapon System. System currently in Test and Evaluation; AIM-7M, AIM-54C, AMRAAM, Standard Missile 2, Rolling Airframe Missile, NATO Seasparrow and AEGIS. Weapons System to enter Test and Evaluation; 5" Guided Projectile, High Energy Laser, Stand-off Jammer Suppression Missile.

(U) WORK PERFORMED BY: In-House: Naval Weapons Center, China Lake, CA; Naval Air Development Center, Warminster, PA; Pacific Missile Test Center, Point Mugu, CA; Contractors: Bendix Corp., Mishawaka, IN; Teledyne Ryan, San Diego, CA; Speery, Phoenix, AZ; and PDA Engineering, Santa Ana, CA.

(U) PROGRAM ACCOMPLISHMENTS:

1. (U) FY 1981 and Prior Accomplishments: THE QT-33, QF-86H, QT-38, QF-4B, VANDAL and BOMARC full scale targets are operational. An all attitude control system for the QF-4B/N is in development; a feasibility study is in process to provide the QF-4 program with tri-service compatibility. The QT-33 was phased out. The QF-86F development is complete. The BQM-34A/S, BQM-34E/T, AQM-37A and MQM-74C targets are in operational use. The BQM-74C development is complete and T&E is in progress. First articles of the TDU-32 have been received. The TDU-34 and 35 targets are in the flight test stage of development.

2. (U) FY 1982 Program: Conduct flight tests of the QF-4 all attitude control system. Commence development of the BQM target product improvement program. Conduct testing of an open-ocean control system for the BQM-74C. Continue integration of target auxiliary systems into TDU-34 tow target. Modify AQM-37A target to test performance at 90,000 feet and Mach Number 3.5.

Project Number: W0609
Program Element: 64258N
DoD Mission Area: 452 - Aerial Targets

Title: Aerial Target Systems Development
Title: Target Systems Development
Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 Planned Program: Continue development design definition of BQM target product improvement. Commence development of AQM target product improvement program. Complete integration of TDU-34 towed target system. Conduct definition of replacement for QF-86 target. Conduct flight test of AQM-37 variant targets.

4. (U) FY 1984 Planned Program: Commence development of QF-86 replacement. Continue BQM and AQM product improvement programs.

5. (U) Program to Completion: BQM target product improvement will be operational in FY 1986. 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
W0609	Aerial Target System Development	5,201	10,760	10,179	13,699	Continuing	Continuing

Project Number: W0610
Program Element: 64258N
DoD Mission Area: 452 - Aerial Targets

Title: Weapons Systems Test and Evaluation Targets
Title: Targets Systems Development
Budget Activity: 6-Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: During certain phases of weapon systems RDT&E, a requirement exists to exercise the weapon against a simulated threat with size, speed, geometry and maneuverability characteristics that approximate those of hostile aircraft and missiles. For those tests, conversion of aircraft and missiles which are, or are scheduled to become, out-of-service has been found to offer a viable solution. Currently drone converted QF-4 and QF-86 aircraft and the MQM-86 Vandal target, the conversion of the RIM-8G TALOS missile, are used to provide full scale replications of enemy threats. In addition, subscale targets such as the BQM-34, BQM-74 and AQM-37 approximately augmented are also used for weapon system test and evaluation.

(U) RELATED ACTIVITIES: Test and Evaluation of developmental weapon systems and fleet operational training.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA. Contractors: Bendix Aerospace Division, Mishawaka, IN; Teledyne Ryan Aeronautical, San Diego, CA; and Speery, Phoenix, Arizona.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: QF-86H and QF-4B full-scale targets and CQM-10B BOMARC missile target conversions proceeded on an "as needed" basis. QF-4 refinements and mission configuration subsystems were partially completed. Production of QF-86F was initiated. MQM-8G VANDAL is in production. QT-33 and QT-38 phased out.

2. (U) FY 1982 Program: Continue conversion of QF-86F and QF-4 aircraft to maintain a total inventory of 20 full-scale targets operational in the Navy. Continue conversion MQM-8G target missiles to meet Test and Evaluation requirements. Initiate procurement of target auxiliary system equipments for RDT&E target applications formally funded with Weapon Procurement Navy funds. Phase out CQM-10B. Procure AQM-81 and AQM-37 targets for weapon system test and evaluation.

3. (U) FY 1983 Planned Program: Continue procurement of Target Auxiliary Systems for RDT&E use. Continue conversion of aircraft and missiles to maintain an inventory of targets to meet test and evaluation requirements. Procure BQM-34 Recoverable Targets and AQM-37 in support of weapons development programs such as AEGIS, Standard Missile II, Phoenix, and Advanced Medium Range Air-to-Air Missile.

4. (U) FY 1984 Planned Program: Continue conversion of QF-4, QF-86 and VANDAL targets. Continue production of AQM-37, BQM-34S and procurement of target auxiliary system equipment to support RDT&E targets.

Project Number: W0610
Program Element: 64258N
DoD Mission Area: 452 - Aerial Targets

Title: Weapons Systems Test and Evaluation Targets
Title: Targets Systems Development
Budget Activity: 6-Defensewide Mission Support

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
W0610	Weapons Systems Test and Evaluation Targets	15,707	24,067	26,685	28,261	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64703N
Title: Training Devices Prototype Development
DoD Mission Area: 430 - Non-System Training Devices
Budget Activity: 6 - Defensewide Mission Support

(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	13,899	10,361	6,575	3,743	Continuing	Continuing
W0291	Automated Air Intercept Controller Trainer	504	0	0	0	0	1,835
X0783	Naval Wargaming System Development	4,013	2,218	0	0	0	19,006
W0784	Simulated Avionics Maintenance Trainer	257	270	0	0	0	3,218
W0788	Aviation Weapon Systems Simulation	576	0	0	0	0	2,098
Z0789	Class A Electronic Equipment Maintenance Simulator	1,068	748	99	0	0	4,748
S0791	Synthetic Firefighting Training	985	438	1,040	0	0	4,731
Z0953	Advanced Submarine Electro-Optical/Visual Trainer (Transferred to Program Element 64716N)	513	0	0	0	0	1,113
S0999	Weapons Delivery Simulation	835	402	0	0	0	3,391
S1003	Air Cushion Vehicle Operator Trainer	701	363	670	732	758	3,226
S1017	Expendable Mobile ASW Training Target	493	1,802	1,783	1,199	0	5,077
X1328	Battle Group Interactive Gaming System	3,520	3,398	2,983	1,812	2,489	14,502
W1344	Fixed Pipper Gunnery Simulator (ex-W0786)	50	0	0	0	0	1,473
W1345	Movable Pipper Gunnery Simulator (ex-W0786)	384	722	0	0	0	1,106

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Meets requirements of the Chief of Naval Operations, Fleet Commanders in Chief, and Chief of Naval Education and Training for simulation that offers safety in training, faster training, skill maintenance at less cost, reduced training equipment cost, and training for new weapon system.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continuing emphasis is placed on simulation because of reduced operational tempo and reduction of fuel for steaming and flying; to maintain high levels of skill; to reduce training costs; to reduce environmental impact of training. Eleven projects listed have been completed or will be completed in FY 1983; three are continued into FY 1984. The above funding includes outyear escalation and encompasses all work or development phases now planned or anticipated for each individual project.

(U) COMPARISON WITH FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY

Program Element: 64703N
DoD Mission Area: 430 - Non-System Training Devices

Title: Training Devices Prototype Development
Budget Activity: 6 - Defensewide Mission Support

1982 Descriptive Summary and that shown in this Descriptive Summary are a result of the following: (1) W0291, Automated Air Intercept Controller, decreased by 3 in FY 1981*; (2) X0783, Naval Wargaming System Development, decreased by 35 in FY 1981*, and increased by 336 in 1982 to accomplish acceptance testing; (3) W0784, Simulated Avionics Maintenance Trainer, decreased by 1 in FY 1981*, and by 3 in FY 1982, (4) W0788, Aviation Weapon Systems Simulation, decreased by 4 in FY 1981*; (5) Z0789, Class A Electronic Equipment Maintenance Simulator, decreased by 165 in FY 1981*, decreased by 9 in FY 1982*, decreased by 2 in FY 1983*, (6) S0791, Synthetic Firefighting Training, decreased by 7 in FY 1981* and decreased 5 in FY 1982*, and increased by 1040 in FY 1983 to cover increased cost for meeting environmental emission requirements; (7) Z0953, Advanced Submarine Optical/Visual Trainer, decreased by 3 in FY 1981*; (8) S0999, decreased 7 in FY 1981* and decreased by 5 in FY 1982*; (9) S1003, Air Cushion Vehicle Operator Trainer, decreased by 22 in FY 1981*, decreased by 4 in FY 1982*, and decreased by 58 in FY 1983*; (10) S1017, Expendable Mobile ASW Training Target, decreased by 24 in FY 1982 and increased 460 in FY 1983 to cover the increased cost of procuring test and evaluation prototypes; (11) Z1328, Battle Group Interactive Gaming System, decreased by 232 in FY 1981*, decreased by 229 in FY 1982*, and decreased by 110 in FY 1983*; (12) W1344, Fixed Pipper Gunnery Simulator increased by 12 in FY 1981 to cover a minor increase in completion cost. (13) W1345, Movable Pipper Gunnery Simulator, increased by 1 in FY 1981* and 9 in FY 1982.

*Funding decrease resulted from Navy Application of a Congressionally imposed reduction from FY 1981 supplemental budget or FY 1982 amended budget reductions.

(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	12,039	14,388	10,312	5,242	Continuing	Continuing
W0291	Automated Air Intercept Controller Trainer	519	507	0	0	0	1,838
X0783	Naval Wargaming System Development	4,244	4,048	1,882	0	0	18,705
W0784	Simulated Avionics Maintenance Trainer	233	258	273	0	0	3,222
W0786	Laser/Holographic Applications	529	0	0	0	0	968
X0787	Submarine Advanced Signal Training System	425	0	0	0	0	3,064
W0788	Aviation Weapon Systems Simulation	385	580	0	0	0	2,102
Z0789	Class A Electronic Equipment Maintenance Simulator	1,738	903	757	101	0	4,669
S0791	Synthetic Firefighting Training	412	992	443	0	0	3,703
S0884	Submarine Advanced Reactive Tactical Trainer (Transferred to Program Element 64716N)	1,850	350	0	0	0	3,032
X0953	Advanced Submarine Optical/Visual Trainer (Transferred to Program Element 64716N)	600	516	0	0	0	1,116

Program Element: 64703N
DoD Mission Area: 430 - Non-System Training Devices

Title: Training Devices Prototype Development
Budget Activity: 6 - Defensewide Mission Support

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
S0999	Weapons Delivery Simulation	804	842	407	0	0	3,403
S1003	Air Cushion Vehicle Operator Trainer	0	723	367	728	1,589	3,407
S1017	Expendable Mobile ASW Training Target	0	493	1,826	1,323	1,028	4,670
Z1328	Battle Group Interactive Gaming System	300	3,752	3,627	3,093	4,206	14,978
W1344	Fixed Pipper Gunnery Simulator	0	38	0	0	0	1,461
W1345	Movable Pipper Gunnery Simulator	0	386	731	0	0	1,117

(U) OTHER APPROPRIATIONS FUNDS:

Successful technology is incorporated in "first article" trainers programmed in PE 64714N, 64715N and 64716N, in which follow-on procurements are planned.

Program Element: 64703N
DoD Mission Area: 430 - Non-System Training Devices

Title: Training Devices Prototype Development
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for prototype development of general purpose simulation training systems and demonstration applications of general purpose technology. The requirements of the program element are: (1) provide training in operations that would be unsafe in the live circumstance; (2) reduce cost and improve efficiency; (3) train personnel to perform tasks and functions of new weapons systems; (4) improve tactical/team/crew training in single and multi-system situations in all threat environments; (5) reduce requirements for steaming and flying; (6) diagnose deficiencies in performance and maintain proficiency of personnel; and (7) reduce environmental impact. The purpose of each project, and principal objectives are: W0291, AUTOMATED AIR INTERCEPT CONTROLLER TRAINER: Automate the Training of Air Intercept Controllers personnel, using voice recognition and synthesis, 1,2,5,6; X0783, NAVAL WARGAMING SYSTEM DEVELOPMENT: Train senior officers in strategic warfare, 2,4,6; W0784, SIMULATED AVIONICS MAINTENANCE TRAINER, Development of trainers for electronic and W0788, AVIATION WEAPON SYSTEMS SIMULATION: Using computer for routine instructor functions in simulators, Z0789, CLASS A ELECTRONIC EQUIPMENT MAINTENANCE SIMULATOR: Generalized simulation for Class A school electronics maintenance training, 2,3,6; S0791, SYNTHETIC FIREFIGHTING TRAINING: New system of firefighting training with natural gas in lieu of black oil, 1,2,4,7; Z0953, ADVANCED SUBMARINE ELECTRO-OPTICAL/VISUAL TRAINER: Tactical training using new periscope sensor systems, 2,3,4,6; S0999, WEAPONS DELIVERY SIMULATION: Surface gunnery training with reduced range impact, 1,2,4,5,6,7; S1003, AIR CUSHION VEHICLE OPERATOR TRAINER: Training system for operators of air cushion landing craft, 1,2,3,5,6; S1017, EXPENDABLE MOBILE ANTI-SUBMARINE WARFARE TRAINING TARGET: At-sea target simulating modern high speed submarines, 2,4,6; X1328, BATTLE GROUP INTERACTIVE GAMING SYSTEM: Train battle group commanders in tactical decision making, 2,4,5,6; W1344 and W1345, FIXED AND MOVABLE PIPPER GUNNERY SIMULATORS: Laser technology in air-to-air gunnery practice, 1,2,5,6,7.

(U) RELATED ACTIVITIES: Navy Program Element 62757N, Human Factors Engineering and Simulation Technology, and PE 63733N, Training Devices Technology, which provide technology advances (e.g., display systems, computer program improvements, maintenance simulation techniques, verification of substitutability) for application to engineering development in PE 64714N, Aviation Warfare Training Devices, 64715N Surface Warfare Training Devices and 64716N Submarine Warfare Training Devices. Also related are Army PE 62726, Non-Systems Training; 63216A, Synthetic Flight Simulation Development. 63738A, Non-Systems Training Devices Development; 63744A, Training Simulation; 64217A, Synthetic Flight Training System, 64715A, Non-Systems Training Devices Engineering; Air Force PE 62205F, Training and Simulation Technology; 63227F, Advanced Simulator Development, and 64227F, Flight Simulator Development.

(U) WORK PERFORMED BY: In House: Naval Training Equipment Center, Orlando, FL; Navy Personnel Research and Development Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Surface Weapons Center, Dahlgren, VA; Contractors: International Laser Systems, Inc., Orlando, FL; Logicon, Inc., San Diego, CA; Advanced Technology Systems, Roselle, NJ; Applied Science Associates, Valencia, PA; Data General, Orlando, FL; Elechtech Associates, North Stonington, CT., Computer Sciences Corporation, Falls Church, VA.; University of Southern California Behaviorial Tecnology Laboratory, Redondo Beach CA.; Cubic Corporation, San Diego, CA.; Applied Physics Laboratory, University of Washington, Seattle, WA.; Mystech Inc., Mystic, Conn.

Program Element: 64703N
DoD Mission Area: 430 - Non-System Training Devices

Title: Training Devices Prototype Development
Budget Activity: 6 - Defensewide Mission Support

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 And Prior Accomplishments: During its lifetime this program has developed a number of training devices that are now being used for training. Examples are the BQQ-5 Sonar Operator Trainer and the Mine Warfare Trainer. W0291 AUTOMATED AIR INTERCEPT CONTROLLER TRAINER: Installed field site and completed test and evaluation. X0783, NAVAL WARGAMING SYSTEM DEVELOPMENT: System completed and ready for installation. W0784, SIMULATED AVIONICS MAINTENANCE TRAINER: Evaluated intermediate-level electronic subsystem maintenance trainer; completed fleet evaluation of intermediate-level electro-mechanical subsystem trainer; completed fabrication of organizational-level electro-mechanical subsystem; X0787, SUBMARINE ADVANCED SIGNAL TRAINING SYSTEM: Completed project; W0788, AVIATION WEAPON SYSTEMS SIMULATION: Completed training system analysis and functional design of weapon system trainer; developed design guidelines for other applications; S0791, SYNTHETIC FIREFIGHTING TRAINING: Completed half of simulated fires; developed simulated firefighting agents; Z0789, CLASS A ELECTRONIC EQUIPMENT MAINTENANCE SIMULATOR: Completed system fabrication; installed prototype in class A school; began test and evaluation; S0999, WEAPONS DELIVERY SIMULATION: Completed system fabrication; began test and evaluation; W1344, FIXED PIPPER GUNNERY SIMULATOR: Completed project; S1003, AIR CUSHION VEHICLE OPERATOR TRAINING SYSTEM: Identified training requirements; Identified hardware options; commenced evaluation of small ACV; S1017, EXPENDABLE MOBILE ASW TRAINING TARGET: Technology issues identified; in water capability concepts validated; Z1328, BATTLE GROUP INTERACTIVE GAMING SYSTEM: Completed analysis of development options; W1345, MOVABLE PIPPER GUNNERY SIMULATOR: Completed development of movable gunsight.

2. (U) FY 1982 Program: X0783, NAVAL WARGAMING SYSTEM DEVELOPMENT: Deliver system; Complete acceptance testing; W0784, SIMULATED AVIONICS MAINTENANCE TRAINER: Complete organizational-level mechanical subsystem trainer; specifications, test and evaluation plan, training courses, and implementation plan; commence fleet evaluation of intermediate-level mechanical subsystem trainer; S0791, SYNTHETIC FIREFIGHTING TRAINING: Complete design specifications; Z0789 CLASS A ELECTRONIC EQUIPMENT MAINTENANCE SIMULATOR: Complete test and evaluation; approval for service use; evaluate other school applications; S0999, WEAPONS DELIVERY SIMULATION: Complete test and evaluation of shipboard system; commence development of water impact scoring subsystem; S1003, AIR CUSHION VEHICLE OPERATOR TRAINER: Evaluate small air cushion vehicle; develop procedures trainer requirements; S1017, EXPENDABLE MOBILE ANTI-SUBMARINE WARFARE TRAINING TARGET: Fabricate, deliver and test engineering development models; 1328, BATTLE GROUP INTERACTIVE GAMING SYSTEM: Select design base; design system; initiate development; W1345, MOVABLE PIPPER GUNNERY SIMULATOR: Install movable pipper gunsight in fleet aircraft; conduct operational evaluation.

3. (U) FY 1983 Planned Program: S0791, SYNTHETIC FIREFIGHTING TRAINING: Complete fabrication; install; conduct acceptance testing; Z0789 CLASS A ELECTRONIC EQUIPMENT MAINTENANCE SIMULATOR: Deliver specifications to Naval Training Equipment Center; S1003, AIR CUSHION VEHICLE OPERATOR TRAINER: Complete feasibility study for use of an Air Cushion Vehicle training simulator; S1017, EXPENDABLE MOBILE ANTI-SUBMARINE WARFARE TRAINING TARGET: Complete fabrication; X1328, BATTLE GROUP INTERACTIVE GAMING SYSTEM: Commence site 1 fabrication;

4. (U) FY 1984 Planned Program: S1003, AIR CUSHION VEHICLE OPERATOR TRAINER: Evaluate prototype training devices; S1017,

Program Element: 64703N
Title: Training Devices Prototype Development
DoD Mission Area: 430 - Non-System Training Devices
Budget Activity: 6 - Defensewide Mission Support

EXPENDABLE MOBILE ASW TRAINING TARGET: Complete technical evaluation and operational evaluation. X1328, BATTLE GROUP INTERACTIVE GAMING SYSTEM: Complete site 1 test and acceptance.

5. (U) Program to Completion: This is a continuing program. Mix of projects changes from year to year as new requirements are defined.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 64709N
Title: Prototype Manpower/Personnel Systems
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Budget Activity: 6 - Defensewide Mission Support

(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	979	4,997	2,152	3,983	Continuing	Continuing
Z1039	Navy Personnel Accessioning System	345	0	0	0	0	1,271
Z1252	Attrition Control Systems	126	149	176	174	197	822
Z1302	Officer Career Models	85	91	0	0	0	266
Z1385*	Computerized Adaptive Testing	423	0	0	1,368	3,721	7,838
Z1496	Tri-Service Manpower Management	0	4,757	1,976	2,441	Continuing	Continuing

* FY 1982 funds are in PE 63707N.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: As a result of decreases in the military-eligible population, increases in the rate of training school failures, and unprecedented levels of attrition, the Navy faces serious problems in keeping its ships, aircraft, and shore stations adequately manned. By the late 1980s, the military total force (including reserve components) will need to recruit one of every two qualified and available males in the population. The cost implications of this are enormous. Navy efforts in Exploratory and Advanced Development now permit the creation of a highly sophisticated system capable of greater effectiveness and efficiency in recruiting, testing, accessioning and retaining qualified personnel. Since many of the problems addressed by this program are common to the other services, a major portion of the program will be a DoD-wide effort addressing problems common to the three services.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Z1252. ATTRITION CONTROL SYSTEMS: This project will develop, test, and evaluate adjustment training for administration prior to recruit training and a shipboard orientation program for administration at the fleet training center prior to first ship assignment aimed at reducing attrition rates among General Detail personnel. Z1496. TRI-SERVICE MANPOWER MANAGEMENT PROGRAM: This joint research effort will be managed by a DoD-wide steering group. Research will be conducted on critical manpower, personnel and training issues clearly having a multi-service payoff. The above funding profile includes outyear escalation and encompasses all work or development phases now planned or anticipated for each individual 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 that shown in this Descriptive Summary are as follows. Z1039, NAVY PERSONNEL ACCESSIONING SYSTEM was decreased by 437 in FY 1981 to complete software development and then was canceled due to budget cuts. Z1252, ATTRITION CONTROL

Program Element: 64709N
Title: Prototype Manpower/Personnel Systems
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Budget Activity: 6 - Defensewide Mission Support

SYSTEMS was increased by 35 in FY 1981 to begin follow-up tracking of participants, decreased by 52 in FY 1982 and decreased by 27 in FY 1983 due to earlier accomplishment of work. Z1302, OFFICER CAREER MODELS was decreased 5 in FY 1981 due to better cost estimate. Z1343, R&D INFORMATION SYSTEM was transferred to PE 65804 in FY 1981. Z1385, COMPUTERIZED ADAPTIVE TESTING was increased by 423 in FY 1981 to develop preliminary design concepts. Z1496, TRI-SERVICE MANPOWER MANAGEMENT was decreased by 69 in FY 1982 due to budget reductions and by 3,459 in FY 1983 due to budget cut.

(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	1,582	1,435	6,334	6,992	Continuing	Continuing
Z1039	Navy Personnel Accessioning System	926	782	1,216	1,354	5,061	9,339
Z1040	Force Management System Development	100	472	0	0	0	572
Z1252	Attrition Control Systems	0	91	201	203	407	902
Z1302	Officer Career Models	90	90	91	0	0	271
Z1343 *	R&D Information System	180	0	0	0	0	180
Z1385 **	Computerized Adaptive Testing	286	0	0	0	3,931	6,257
Z1496	Tri-Service Manpower Management	0	0	4,826	5,435	Continuing	Continuing

* Transferred to PE 65804 in FY 1981.
** FY 1981 to be provided by reprogramming.

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 64709N Title: Prototype Manpower/Personnel Systems
DoD Mission Area: 440 - Technical Integration/Studies and Analyses Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Z1252. ATTRITION CONTROL SYSTEMS: There is a high attrition rate for individuals whose Armed Services Vocational Aptitude Battery scores do not qualify them for A schools. This effort develops and packages adjustment and orientation training systems for General Detail personnel (GENDETS). The adjustment training is under development for administration prior to recruit training. The orientation training is under development for administration at the fleet training center prior to first ship assignment. The purpose of the training programs is to reduce attrition of GENDETS by familiarizing them with experiences they may encounter later so that their reactions will not lead to attriting. Instructor manuals and training materials are under development and current estimates indicate a possible reduction from 15 to 10 percent attrition rate for GENDETS receiving adjustment training compared to those that do not. Z1385. COMPUTERIZED ADAPTIVE TESTING: Develop, test and evaluate procedures and equipment for computer-based automated administration of adaptive personnel tests for military enlistment selection and classification. Evaluate the feasibility of implementation of such a system at the Armed Forces Enlistment and Examining Stations as a replacement for the current paper-and-pencil Armed Services Vocational Aptitude Battery (ASVAB). The goal of this joint service effort is to correct shortcomings present in the current paper and pencil system including vulnerability to compromise and clerical error, poor discrimination at high and low ability level, high replacement costs, awkward administering procedures, and excessive test length. Substantial savings should result in administration time for ASVAB since the average administration time is 3 to 4 hours for the paper and pencil version and under 2 hours for the computer version. Z1496. TRI-SERVICE MANPOWER MANAGEMENT PROGRAM: This joint service research program will fund research on critical manpower, personnel and training issues that clearly would have a multi-service payoff. Proposed research efforts would be suggested by any of the Services or OSD. This joint effort, which is additive to existing manpower research programs, will be managed by a DoD-wide (OSD and the Services) steering group. The impetus for the project is grounded in the facts that the most critical manpower issues facing DoD are not service specific and that there is both DoD and Congressional interest in a joint program.

(U) RELATED ACTIVITIES: Program is maintained with counterparts in the Department of Defense, the Army, and the Air Force. Related Program Elements are 62763N, Naval Personnel Support Technology; and 63707N, Manpower Control Systems Development; 62722A, Manpower, Personnel and Training; 62703F, Personnel Utilization Technology.

(U) WORK PERFORMED BY: In-House: Navy Personnel Research and Development Center, San Diego, CA; U. S. Office of Personnel Management, Washington, D.C.; Federal Computer Performance Evaluation and Simulation Center, Washington, D.C.; Naval Postgraduate School, Monterey, CA; Army Research Institute for the Behavioral and Social Sciences, Alexandria, VA; Air Force Human Resources Laboratory, San Antonio, TX. Contractors supporting this element include: Institute for Behavioral Research, Silver Spring, MD; Computer Network Corporation, Washington, D.C.; University of Minnesota, MN; Data/Ware Development, Inc., San Diego, CA; Electronic Data Systems, San Diego, CA.

Program Element: 64709N
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Prototype Manpower/Personnel Systems
Budget Activity: 6 - Defensewide Mission Support

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:

1. (U) FY 1981 and Prior Accomplishments: Z1252. ATTRITION CONTROL SYSTEMS: Developed recruit adjustment and shipboard orientation package for enlisted personnel. Z1302. OFFICER CAREER MODELS: Completed the addition of more detailed paths to the surface warfare officer model and completed the operational submarine officer and prototype aviation officer models. Initiated survey of attitudes at career transition points. Classified shore subspecialty billets. Z1385. COMPUTERIZED ADAPTIVE TESTING: Completed design concept and contract awarded for prototype development; completed development of question bank for prototype.

2. (U) FY 1982 Program: Z1252. ATTRITION CONTROL SYSTEMS: Evaluate General Detail personnel adjustment to shipboard life. Complete development of the recruit adjustment and orientation packages for General Detail personnel. Z1302. OFFICER CAREER MODELS. Continue study/research on careers and choices; complete attitude surveys. Z1385. COMPUTERIZED ADAPTIVE TESTING: Complete the test and evaluation of the prototype testing setting. Z1496. TRI-SERVICE MANPOWER MANAGEMENT: Subprojects addressing DoD-wide manpower, personnel and/or training issues will be undertaken. These efforts will be selected by the Tri-Service Manpower Management Steering Group from proposals submitted by the Services and Office of the Secretary of Defense.

3. (U) FY 1983 Planned Program: Z1252. ATTRITION CONTROL SYSTEMS: Report on General Detail personnel attrition after one year in the fleet and administer a second questionnaire to measure General Detail adjustment to shipboard life. Z1302. OFFICER CAREER MODELS: Complete the integration of the operational model with the surface warfare and restricted line/staff communities and with at-sea/shore billets. Z1496. TRI-SERVICE MANPOWER MANAGEMENT: The program will continue to address major manpower, personnel and training issues that can benefit from a joint R&D approach.

4. (U) FY 1984 Planned Program: Z1252. ATTRITION CONTROL SYSTEMS: Develop and test implementation strategies for Recruit Adjustment and Fleet Orientation Training Programs. Report on attrition after two years in the fleet. Z1385. COMPUTERIZED ADAPTIVE TESTING: Feasibility assessment. Z1496. TRI-SERVICE MANPOWER MANAGEMENT: The program will continue to address major manpower, personnel and training issues that can benefit from a joint R&D approach.

5. (U) Program to Completion: This is a continuing program composed of individual projects that generally have a completion date.

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65151M
Title: Studies and Analysis Support, Marine Corps
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Budget Area: 6 - Defensewide Mission Support

(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	2309	2776	2148	2619	Continuing	Continuing
C0030	Studies and Analysis Support, Marine Corps	2309	2776	2148	2619	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provide for studies and analyses to be conducted by research organizations and DOD agencies in support of Marine Corps programs and requirements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continuation of funding for studies and analyses initiated in previous years and continuing. In addition 15 studies are presently planned for FY 1983 initiation. Significant areas of interest include:

Concept of Employment Landing Craft Air Cushion (LCAC)
Determination of CW Munitions Requirements for the MAF
Combat Service Support of the Marine Combined Arms Task Force in RDJTF Operations
System Configuration Requirements for Automatic Data Processing Equipement for the FMF
Logistic Support Requirements of Maneuver Warfare
Mission Area Analysis for Amphibious Warfare in the Midrange 1990-2000 Air Defense for Mechanized Forces
FMF Test, Measurement and Diagnostic Equipment Requirements (1985-1990)
Science, Technology, Systems and Equipment
Operations and Force Structure.

As this is a continuing program, the above funding includes out year 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 in the funding profile shown in the FY 1982 Decriptive Summary and that shown in this Descriptive Summary are as follows: A decrease of 1191 in FY 1981 is a result of improved management control, supervision and review procedures by the Marine Corps, preventing duplication of studies and elimination of nonessential efforts. A number of studies were incrementally funded into FY 1982. The FY 1982 decrease of 1636 reflects a Congressional reduction of 1,273 and a 363 decrease based upon the improved Marine Corps management of the program and may require reduction in scope or elimination of some studies. The FY 1983 reduction of 2828 consists of a 941 reduction resulting from improved management and an adjustment of -1,887 during budget development.

Program Element:65151M
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Marine Corps
Budget Area: 6 - Defensewide Mission Support

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	2530	3500	4412	4976	Continuing	Continuing
C0030	Studies and Analysis Support, Marine Corps	2530	3500	4412	4976	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element:65151M
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Marine Corps
Budget Area: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Studies are conducted to evaluate preferred concepts, policies, techniques, methods and systems and their respective costs, for employment of land, sea and air forces; to determine and apply improved logistics methods; to determine preferred mixes of forces to meet existing and potential threats; to establish requirements for weapons systems and other military material; or to compare the effectiveness and costs of alternatively constituted and equipped forces.

(U) RELATED ACTIVITIES: PE 65153M, Marine Corps Operations Analysis Group, Center of Naval Analyses, funds the Marine Corps Operations Analysis, which provides supplementary analysis capability.

(U) WORK PERFORMED BY: In-House: Marine Corps Development and Education Command, Quantico, VA; Naval Weapons Center, China Lake, CA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD: Contractors: Stanford Research Institute International, Menlo Park, CA; Potomac General Research Group, McLean, VA; B.K. Dynamics Inc; Rockville, MD; Quantics Inc., Wayne, PA; Falcon, Buffalo, NY; Calculon, Arlington, VA; CACI, Arlington, VA; Computer Science Corp., Falls Church, VA; BDM Corp, Norfolk, VA; ORI, Silver Springs, MD; Baittel, Columbus, OH; Booze Allen & Hamilton, Bethesda, MD; Science Application Inc., McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Prior Accomplishments include: (1) Fire Support Requirements for Amphibious Operations and Extended Operations Ashore During the Midrange (1983-1990) to determie the midrange fire support requirements for amphibious operations and extended operations ashore. (2) Tactical Mobility for the Amphibious Assault and Subsequent Operations Ashore in the Midrange (1980-1990) to revise the U.S. Marine Corps midrange tactical mobility requirements and to identify the best mix of mobilty assets. (3) Composite Requirements to Provide Effective Anti-Air Defense for the Marine Amphibious Force to determine the best mix of airborne and ground anti-aircraft weapon systems and tactics to provide effective anti-air defense for the Marine Amphibious Force. (4) Nuclear, Biological and Chemical Defense Readiness to determine the state of Marine Corps Nuclear, Biological and Chemical defense readiness and assess the current ability of Marine Corps units, both ground and aviation, to accomplish assigned missions in Nuclear, Biological and Chemical environments. (5) Marine Corps Signal Intelligence/Electronic Warfare Requirements (1980-1990) to identify deficiencies in current Marine Corps Signal Intelligence/Electronic Warfare doctrine, tactics and techniques and to determine the optimum organizational structure to provide Signal Intelligence/Electronic Warfare support. (6) Navy/Marine Corps Engineer and Construction Operations (1980-1990): To review the roles, missions and material for naval construction units, Fleet Marine Force Combat Engineer Units and civilian contractors; Program and (7) Cost-Effectiveness of Alternative Means of Intelligence Collection/Production: To identify alternative means of intelligence collection/production systems and compare costs and effectiveness of each. (8) Marine Corps Midrange Threat Scenarios and Target Lists: To review and update the threat forces, targets, concepts of operations and tactics for standard Marine Corps scenarios and to develop research scenarios for operations in Iran/Saudi Arabia, the Korean Peninsula, and adjacent waters; FY 1981 initiatives were as follows:

Program Element:65151M
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Marine Corps
Budget Area: 6 - Defensewide Mission Support

(1) Optimal Marine Infantry Battalion Structure for the Midrange: to men; (2) Impact of Cold Weather on Amphibious Assault in the Midrange: to identify capabilites as well as deficiencies in doctrine tactics, techiques and equipment during a cold-weather amphibious assault; (3) Requirements and procedures for Decontamination, Collective Protection and Doctrinal Development: To review all on-going and programmed studies conducted under the Marine Corps 5 year Studies Program. To assess the magnitude of the nuclear chemical and biological threat; (4) Concept of operations of Nuclear, Biological and Chemical Defense: To develop a concept of Nuclear, Biological and Chemical operations for the midrange; (5) Landing Force Communications in the Midrange: To evaluate the collective impact of the introduction of a multitude of new communication and tactical data systems on personnel, training and readiness; (6) Organization and operation of the Force Landing Support Party: To develop alternate concepts for the Landing Force Shore Party in order to provide required support to all marine forces in amphibious operations. (7) Optimum Utilization Requirements for Women Marines in the Midrange: To determine the real and perceived acculturative problems associated with the employment of women in traditional and non traditional work roles; (8) Organization of Ground Reconnaissance Units in the Fleet Marine Forces (FMF); To determine the roles, missions, organization and structure for ground reconaissance units; (9) Marine Corps Artillery Force Structure; to determine the impact of adopting the M-198 howitzer on mobility, logistics, support, manpower and force structure; (10) Marine Assault Support Helicopter Defensive Armament Study: to determine a defensive armament system for the HXM helicopter; (11) Development of Marine Corps Science and Technology Objectives Documents to develop a new/replacement document for providing guidance for DOD and industry R&D programs: (12) Determination and application of improved methods and/or equipment of MAGTF minelaying/mine clearing in the ADA during the midrange: To determine current capability to meet requirements and identify equipment, tactics and possible organizational changes necessary to conduct amphibious operations in the midrange. (13) Integration of Navy/USMC Command, Control and Communications Systems for Amphibious Operations: To determine the concept of operations for each of the appropriate Marine Tactical Command and Control Systems (MTACCS) Master Plan. (14) Concealment and Deception for Amphibious Assaults and Subsequent Operations Ashore During the Midrange: To develop a comprehensive doctrine for planning and executing a concealment and deception program as a part of all operation plans/orders for Amphibious Assault. (15) Transient Flow and Permanent Change of Station (PCS) Analysis: To analyze the flow of transient personnel during various types of PCS moves.

2. (U) FY 1982 Program: Six of the FY 1981 studies have continued into FY 1982. In addition, the following new studies are planned for initiation in the FY 1982; (1) Amphibious Lift Factors, (2) Marine Corps Simulator Training Needs in the Midrange (3) Determination of Ammunition Training Rates for the Marine Forces (4) Marine Corps Communication and Organization Structure During the Midrange (5) Aircraft Battle Damage Repair in the Amphibious Objective Area (6) Energy Conservation Requirements Programming (7) Minority Officer Selection/Retention in the Marine Corps (8) Econometric Analysis of Guarantee Option Inducements (9) Analysis of Occupational Field Lateral Movement (10) Marine Corps Class V Combat Planning Factors Update for POM-84 (11) Combat Engineer Structure within the Marine Division (12) Force Service Support Group Structure (13) High Power to Weight Ratio Engine Comparison (14) Organization and Structure within the MAF for Storage and Distribution of Bulk Fuel (15) Organization and Structure of the Assault Amphibian Vehicles (AAV) and Tanks within the Marine Corps.

Program Element:65151M
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Marine Corps
Budget Area: 6 - Defensewide Mission Support

3. (U) FY 1983 Planned Program: Some of the FY 1982 studies will continue into FY 1983. In addition, the following new studies are planned for initiation in FY 1983:

Concept of Employment Landing Craft Air Cushion (LCAC)
Determination of CW Munitions Requirements for the MAF
Combat Service Support of the Marine Combined Arms Task Force in RDJTF Operations
System Configuration Requirements for Automatic Data Processing Equipment for the FMF
Logistic Support Requirements of Maneuver Warfare
Mission Area Analysis for Amphibious Warfare in the Midrange 1990-2000 Air Defense for Mechanized Forces
FMF Test, Measurement and Diagnostic Equipment Requirements (1985-1990)
Science, Technology, Systems and Equipment
Operations and Force Structure.

4. (U) FY 1984 Planned Program: The following studies have been tentatively identified for initiation in FY 1984: (1) Emergency Battlefield Recovery of Personnel and Equipment during the Midrange, (2) Marine Helicopter Requirements Study (1990-2000), (3) Marine Corps Combat Requirements for Alternative Energy Sources in the Midrange, (4) Tactical Mobility for Amphibious Assault and subsequent operations Ashore (1995-2000), (5) Mission Area Analysis for Close Air Support, (6) Equipment and Maintenance Planning Concepts for RDF, (7) Mission Area Analysis for Tactical Surveillance, Reconnaissance and Target Acquisition.

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

6. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65152N
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Title: Studies and Analysis Support, Navy
Budget Activity: 6 - Defensewide Mission Support

(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	6,422	7,791	7,889	8,291	Continuing	Continuing
M0106	Naval Medical Support Capability	83	129	137	142	Continuing	Continuing
Z0830	Director of Navy Laboratories Studies and Analysis	414	637	703	731	Continuing	Continuing
R0132	CNO Program Analysis and Evaluation	1,815	2,213	2,169	2,284	Continuing	Continuing
R0133	National Academy of Sciences Naval Study Board	388	744	741	748	Continuing	Continuing
R0147	Operational and Strategic Analysis	1,662	1,962	1,989	2,150	Continuing	Continuing
R0145	Advanced Naval Studies	2,060	2,106	2,150	2,236	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This continuing program provides analytical support to the Secretary of the Navy and the Chief of Naval Operations as a basis for major policy and planning decisions.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue scientific and technical studies for setting Navy policy and strategy; optimize tactics and operations; evaluate naval forces requirements; analyze force readiness, and assess the feasibility and worth of alternative future Navy systems through the application of technology, intelligence, and operational 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 reflect decreases of 578 in FY 1981, 645 in FY 1982 and 1,155 in FY 1983 directed by Congress and the Office of Management and Budget to reduce planned obligations for consulting services, studies and other management support services.

Program Element: 65152N
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Navy
Budget Activity: 6 - Defensewide Mission Support

(U) FUNDINGS 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	6,144	7,000	8,436	9,044	Continuing	Continuing
M0106	Naval Medical Support	72	93	136	142	Continuing	Continuing
Z0830	Director of Navy Laboratories Studies and Analysis	364	467	686	724	Continuing	Continuing
R0132	CNO Program Analysis and Evaluation	1,967	2,055	2,419	3,339	Continuing	Continuing
R0133	National Academy of Sciences Naval Study Board	234	400	2,139	917	Continuing	Continuing
R0147	Operational and Strategic Analysis	1,466	1,836	2,168	2,982	Continuing	Continuing
R0145	Advanced Naval Studies	2,041	2,149	888	940	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 65152N
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Navy
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides analytical support to the Secretary of the Navy and the Chief of Naval Operations for major policy and planning decisions. It is the primary source of scientific and technical expertise dedicated to developing guidelines for Navy research and development; improving the quality of Navy analyses of major decisions through application of operations research methods; coordinating research efforts of Navy laboratories; establishing Navy policy, strategy, and doctrine; evaluating requirements for naval forces and programs; and accomplishing those cost-effectiveness tradeoff analyses most important to Navy program planning. Studies and Analysis Support is organized into projects which are coordinated by the Director of Navy Program Planning and administered separately by staff offices of the Chief of Naval Operations, the Chief of Naval Research, the Director of Navy Laboratories, and the Naval Medical Research and Development Command.

(U) RELATED ACTIVITIES: Program Element 65154N, Center for Naval Analyses, Navy; Program Element 65153M, Marine Corps Operations Analysis Group; Program Element 65151M, Studies and Analysis Support, Marine Corps.

(U) WORK PERFORMED BY: In-House: Laboratory support to this program is provided by nine ten in-house laboratories including: the Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; Naval Electronics Laboratory Center, San Diego, CA; Naval Surface Weapons Center, Silver Spring, MD; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; and Naval Weapons Center, China Lake, CA. and Naval Research Laboratory, Washington, D.C. Contractors: Approximately fifty contractors including: the National Academy of Sciences, Washington, D.C.; PRC System Sciences Company, McLean, VA; D. H. Wagner, Associates, Paoli, PA; Presearch, Inc., Arlington, VA; Systems Planning and Analysis Corp., Arlington, VA; B. K. Dynamics, Inc., Rockville. MD; Summit Research Corp., Gaithersburg, MD; TRW, Redondo Beach, CA; Administrative Sciences Corp, Alexandria, VA; Advanced Technology, Inc., McLean, VA; Flight Systems, Inc., Newport Beach, CA; Mathtech, Inc., Bethesda, MD; Planning Systems, Inc., McLean, VA; Ramcor, Inc., Vienna, VA; SPC, Arlington, VA; Ketron Inc., Arlington, VA; and the John Hopkins University/Applied Physics Lab, Laurel, MD.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 And Prior Accomplishments: The following studies were carried out to address major issues of naval strategy and programming issues of systems cost effectiveness and Navy force levels: Naval force mix-CVTG air defense analysis; wartime ocean towing and ship salvage, options for retention or disposition of Polaris submarines; air defense of the sea lines of communication; assessment of small submarines and encapsulation of ballistic missiles, Navy Tactical Data System Functional Allocation; Carrier Based Air Logistics; Navy Non-Nuclear Ordnance Inventory Objective; Ocean Surveillance for Anti-Air Warfare; Navy Health Care System Personnel Mix; Navy Role in Countering Soviet Flanking Strategy; and Deep Sea Floor Mission Requirements.

Program Element: 65152N
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Studies and Analysis Support, Navy
Budget Activity: 6 - Defensewide Mission Support

2. (U) FY 1982 Program: The following studies will be carried out in support of Navy program planning and acquisition management: Cruise missile employment; Countering the Over the Horizon Targeting Threat; Estimating Wartime Casualties At Sea; Navy Net Assessment; Hydrographic/Oceanographic Ship Requirements; Evaluation of Training and Education Programs; Analyzing the Cost of Readiness; Ship Procurement Cost Estimation; Missile Procurement and Operating Costs; Evaluation of Alternative Weapons Loads for Aircraft Carriers; Naval Studies Board Investigation of Improved Anti-Air Warfare Systems; Development of Procedures for Coordinating Multiple Sensors; and the CV Air Wing Mix Study.

3. (U) FY 1983 and FY 1984 Planned Programs: Program planning studies such as the following will be conducted: Analysis of Navy requirements and capabilities, cost analyses of developing systems; analysis of alternatives for development and procurement programs force capability evaluation; Navy research and development guidance: and Navy program planning; Navy Net Assessment.

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

5. (U) Milestones: N/A

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65153M

Title: Marine Corps Operations Analysis Group (MCOAG), Center for Naval Analyses

DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Budget Area: 6 - Defensewide Mission Support

(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	2,020	2,481	2,754	2,877	Continuing	Continuing
C0031	Marine Corps Operations Analysis Group	2,020	2,481	2,754	2,877	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Marine Corps Operations and Analysis Group conducts operations research, systems analysis and cost effectiveness studies in the areas of field exercises, operations, tests, weapons systems, tactics, equipments and manpower utilization.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Emphasis on analytical review of major systems and programs will continue. As this is a continuing program, the above funding profile includes outyear escalation and encompassses 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 1981 reprogramming of +99 was necessary to support an approved increase in Marine Corps Operations and Analysis Group personnel. The decrease of 34 in FY 1982 and 96 in FY 1983 reflect budget reductions.

(U) FUNDING AS REFLECTED WITH 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	1807	1921	2515	2850	Continuing	Continuing
C0031	Marine Corps Operations Analysis Group	1807	1921	2515	2850	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not Applicable.

Program Element:65153M

Title: Marine Corps Operational Analysis Group (MCOAG), Center for Naval Analyses

DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Budget Area: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The Marine Corps has a continuing requirement for supplementary analytic support at the Headquarters Marine Corps and field levels for the conduct of major studies and for the conduct of short-term analyses. This program element funds the Marine Corps Operations Analysis Group, a component of the Center for Naval Analyses of the University of Rochester. The Marine Corps Operations Analysis Group conducts operations research, systems analyses, cost effectiveness studies and furnishes objectives and timely evaluations of current Fleet Marine Force opertions, exercises, deployments and tests of weapons, tactics and equipment. A detachment of Marine Corps Operations Analysis Group is located at Quantico, Virginia, to support the Marine Corps Development and Education Command with operations research assistance both in the conduct of studies and in the evaluation of new representatives provide operations analysis assistance to the Fleet Marine Forces in the Atlantic and Pacific Fleets. In 1981 a third field representative was assigned to Marine Aviation Weapons Tactics Squadron (MAWTS) at the request of the Marine Corps.

(U) RELATED ACTIVITIES: PE 65151M Studies and Analysis Support Marine Corps, which provides funding for contract support for studies and analyses.

(U) WORK PERFORMED BY: In-house: Marine Corps Development and Education Command, Quantico, VA. Contractors: Marine Corps Operations Analysis Group, Center for Naval Analyses, University of Rochester, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Marine Corps Operations Analysis Group accomplishments include: Future Amphibious Assault Vehicle Study; 5/4-ton truck analysis; Microminiature Circuit Repair Strategies; Analysis of Foreign Vehicle Candidates for Mobile Protected Weapons Systems; Assault 90; Retention Goal Study; Manpower Requirements Study; Evaluating VTOL Alternatives for Conduct of Vertical Assault; Study of Infantry Weapons Effectiveness; Marine Air Ground Intelligence Study; Analysis of Effectiveness of Equal Cost Mix of Conventional and Advanced Landing Craft; Delays and Losses in Joint Uniform Military Pay Systems/Management Levels; Tactical Air Operations Center-85 Configuration; Tactical Combat Operations Systems.

2. (U) FY 1982 Program: The following projects are of continuing nature: Armed Services Vocational Aptitude Battery Analysis; Impact of Unit Deployment on Retention; Selected Analysis of U.S. Marine Corps Missions; Cost and Operational Effectiveness Analysis for the Landing Vehicle Tracked (Experimental) Weapon Station and the Tactical Combat Operations Systes; Marine Corps Anti-Armor operations in the mid-range; Amphibious Warfare Model Improvements; Amphibious Assault Fire Support Study; Zero Based Tactical Wheeled Vehicle Requirements Analysis; Reenlistment Profiles; Position Location Reporting System (PLRS) Cost and Operations Effectiveness Analysis; Analysis of Marine Tactical Command and Control Systems (MTACCS). It is anticipated that additional requirements will be developed during FY 1982 in the areas of Manpower and personnel, and Operations and Force Structure.

Program Element: 65153M

Title: Marine Corps Operational Analysis Group (MCOAG), Center for Naval Analyses

DoD Mission Area: 440 - Technical Integration/Studies and Analyses

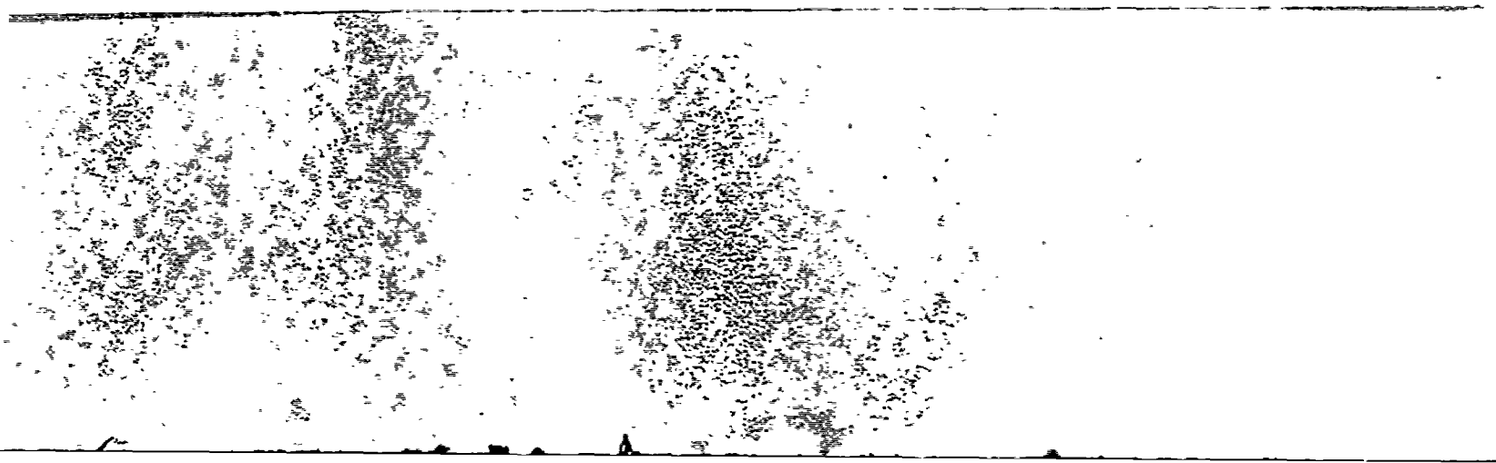
Budget Area: 6 - Defensewide Mission Support

3. (U) FY 1983 Planned Program: The pattern of support by the Marine Corps Operations Analysis Group reflected in prior years will continue in FY 1983 and FY 1984. The Marine Corps Operations Analysis Group will continue to provide a field detachment at the Marine Corps Development and Education Command and representatives at Fleet Marine Forces, Atlantic and Pacific Headquarters and the newly assigned representatives at Marine Aviation Weapons Tactics Squadron (MTAWS).

4. (U) FY 1984 Planned Program: The program continues as depicted in 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: 65154N
Title: Center for Naval Analyses, Navy
DOD Mission Area: 440-Technical Integration/Studies and Analyses
Budget Activity: 6-Defensewide Mission Support

(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	10,393	11,351	12,445	13,381	Continuing	Continuing
R0148	Center for Naval Analyses, Navy	10,393	11,351	12,445	13,381	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program to provide independent, expert analyses of Naval warfare concepts and doctrine, force composition, weapon system performance, operational tactics, readiness, manpower utilization, etc. Additionally, the program provides on-site assistance to operating forces world-wide in improving tactics and readiness of existing systems and in analyzing operational test and evaluation of new systems.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To (1) support the Navy's efforts in planning and balancing forces, weapon system acquisition, program planning and budgeting, assessing naval capabilities, and manpower management; and (2) assist the operating forces by means of operational analysis toward improving current force capabilities. The increase in FY 1983 funding level over that of FY 1982 is to maintain a stable program by offsetting cost increases. As this is a continuing program, the above funding profile includes out year escalation and encompasses all work or development phases now planned or anticipated through 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 reductions of 96 in FY 1981, 282 in FY 1982 resulted from congressional direction to reduce obligations for consulting, studies and other management support contracts in each year. The increase of 773 in FY 1983 is due to refinement of cost estimates during development of the FY 1983 budget.

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

Project No.	Title	FY 1980 Actual	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9,747	10,489	11,633	13,218	Continuing	Continuing
R0148	Center for Naval Analyses, Navy	9,747	10,489	11,633	13,218	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: Not applicable.

Program Element: 65154N
Title: Center for Naval Analyses, Navy
DoD Mission Area: 440-Technical Integration/Studies and Analyses
Budget Activity: 6-Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The Department of the Navy maintains the Center for Naval Analyses to provide independent, professional analyses and evaluations to complement its program of in-house and contractor research and development. The Center conducts a wide range of projects that provide two fundamental services to the Navy: (1) On-site analysis for fleet commanders to improve tactics and readiness of existing systems, and support of operational test and evaluation of new systems. These services have been provided continuously since 1942, (2) Support for Navy responsibilities in planning and balancing forces, weapon systems acquisition, program planning and budgeting, assessing naval capabilities, and manpower management.

(U) RELATED ACTIVITIES: Program Element 65153M, Studies and Analysis Support, Marine Corps; Program Element 65152N, Studies and Analysis Support, Navy. This Program Element, 65154N, funds the Navy research at the Center for Naval Analyses, the Federal Contract Research Center sponsorsed by Navy. Research by this university operated center provides an independent, objective complement to the program of in-house and contractor research funded by Program Element 65152N.

(U) WORK PERFORMED BY: Contractor: The Center for Naval Analyses is administered under contract to the University of Rochester. The main office is situated in Alexandria, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Conducted studies in all areas of naval activity and provided analytical support to operational fleet and force commanders, as well as other Naval commands in the United States and overseas.

(U) Examples are: Future Amphibious Force; Substituting Merchant Ships for Naval Vessels; U.S. Coast Guard Wartime Capabilities; Personnel Management in the All Volunteer Force; Advanced Maritime Patrol Aircraft Requirements; Contractor support in depot level maintenance of Naval aircraft; Tactical Nuclear war at sea, Comprehensive Compensation and Supply; Middle East Contingencies Analysis; Lamps Mark III Logistics Support Options; Manpower Availability; and Wartime Spares Study.

2. (U) FY 1982 Program: Studies include Carrier Battle Group ASW; Improved Submarine Capabilities; Battleship Modernization; Dynamics of Naval Warfare; Naval Strategy and Resources; USN/PRC Navy Cooperation; Soviet Vulnerabilities; Aviation Parts Allowance Policy; Manpower Issues in the 1980s; Process Development for Program Planning and Budgeting; Navy Civilian Career Development; Training Flow Management; AAW Effectiveness; Mission Analysis for Sea Based Cruise Missiles; Technologies for Fleet Air Defense; Command/Control for Deployable Undersea Surveillance Systems; and the Enlisted Reserve Analysis. Direct support to the Fleet includes analysts of the Operations Evaluation Group assigned to provide operation analysis support to the staff of Commander Seventh Fleet, OPTEVFDRPAC, CTF 60, UV-4, Commander Third Fleet, CINCUSNAVEUR, UX-1, CINCPACFLT, OPTEVFOR, VX-5, Commander Sixth Fleet, CINCLANTFLT, and NAVAIRLANT.

3. (U) FY 1983 and FY 1984 Planned Programs: Proposed studies for FY 1983 will be reviewed prior to the start of FY 1983 by the Director, Navy Program Planning to establish priorities and to coordinate the Center for Naval Analyses program with other Navy

Program Element: 65154N
DoD Mission Area: 440-Technical Integration/Studies and Analyses
Title: Center for Naval Analyses, Navy
Budget Activity: 6-Defensewide Mission Support

research. Studies are selected for Center for Naval Analyses based on importance to the Navy and on the requirements for an innovative and independent point of view. The largest single Center for Naval Analyses activity in FY 19 3 will be support of fleet activities. Longer range studies of strategic and tactical warfare, logistics issues, support and manpower questions, etc. will be directed to problems arising in the development of the Navy program for FY 1983 and beyond. In a similar manner, the study pr gram for FY 1984 will be developed to focus Center for Naval Analyses expertise on evaluation of decisions of major concern to the Navy.

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

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65156M
Title: Marine Corps Operations Test and Evaluation
DoD Mission Area: 454 - Other Test and Evaluation
Budget Area: 6 - Defensewide Mission Support

(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	1,184	1,205	3,350	1,874	Continuing	Continuing
C0033	Operational Test and Evaluation Support	1,032	886	2,999	1,498	Continuing	Continuing
C1076	Operational Test and Evaluation Activity	152	319	351	376	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element supports the mission of the Director, Marine Corps Operational Test and Evaluation Activity (MCOTEA) which is to act as manager and field representative for the Commandant of the Marine Corps for Marine Corps operational test and evaluation. It includes support for the operational test and evaluation tasks performed by the designated Fleet Marine Force Commanders and Technical Support Activities.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The support for the Marine Corps Operational Test and Evaluation Activity in the execution of USMC operational test programs will be continued. 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 424 in FY 1981 results from the funding of deficiencies for operational test and evaluation support of Modular Universal Laser Equipment (MULE) and Position Location Reporting System (PLRS). The increase of 1,060 in FY 1983 is a revised estimate of the funding necessary for Marine Corps Operational Test and Evaluation Activity to meet the operational test and evaluation requirements in support of the expanded Marine Corps systems acquisition program. The FY 1982 decrease of 15 is due to refinement of program costs.

(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	(1,517)*	760	1,220	2,290	Continuing	Continuing
C0033	Operational Test and Evaluation Support	(1,377)*	512	898	1,933	Continuing	Continuing
C1076	Operational Test and Evaluation Activity	( )*	248	322	357	Continuing	Continuing

* Non-add. Funded under Program Element 65854M Development Center Support.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element:65156M Title: Marine Corps Operations Test and Evaluation
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Area: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Operational Test and Evaluation Support: This project provides a separate and distinct source of funds for use in the operational test and evaluation of systems being considered for procurement by the Marine Corps. The project provides funds for the test planning, operational testing and preparation of independent evaluation reports as required by current directives. Operational Test and Evaluation Activity: This project funds the management and support of the RDT&E effort assigned to MCOTEA, with emphasis on test planning and independent evaluation of the test results. The project provides five (5) civilian employees and the administrative support of 38 military and civilian personnel not otherwise provided to support the Operational Test and Evaluation activities of the Marine Corps.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-house: Marine Corps Operational Test and Evaluation Activity, MCDEC, Quantico, VA and various Naval Laboratories. Contractors: Potomac General Research Group, McLean, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Operational test plans were prepared for the Operational Test II of Modular Universal Laser Equipment (MULE), Airborne Radio Direction Finding (ARDF) System, AN/UYQ-4 Direct Air Support Central, Unit Level Circuit Switch (ULCS), Digital Communications Terminal (DCT) and Position Location Reporting System (PLRS). The operational testing and evaluation of MULE, ARDS and Landing Vehicle Tracked (LVT7A1) were completed. Support to Operational Test and Evaluation Force (OPTEVFOR) is provided regarding the operational testing of CH-53E Helicopter, JEFF Landing Craft and AV-8B Aircraft. Independent Evaluation Reports (IER) were completed for the M-198 (155mm Howitzer, Joint Tactical Information Distribution Systems (JTIDS), LVT7A1 and items of TRI-TAC equipment, i.e., AN/TTC-170 Digital Group Multiplexer (DGM), Tactical Digital Facsimile (TDF).

2. (U) FY 1982 Program: The operational test and evaluation mission will continue. Specific actions include preparation of test plans for Light Armored Vehicle (LAV), Tactical Air Operations Center (TAOC-85) and Marine Integrated Fire and Air Support System (MIFASS). Conduct and completion of operational test and evaluation of the AN/UYQ-4, DCT, High Mobility Multi-Purpose Wheeled Vehicle (HMMWV), Marine Corps Container System, Digital Wideband Tactical System (DWTS) Electronic Warfare during Close Air Support (EW/CAS), Integrated Signals Intelligence System (I SIS), Forward Pass and PLRS. Comparative operational tests of the candidate LAV systems will be completed and the IER will be published.

3. (U) FY 1983 and FY 1984 Planned Program: The operational test and evaluation mission will continue. Specific actions include conduct of the operational tests of Electronics Maintenance Complex (EMC), Navigation System Using Time and Ranging Global Positioning System (NAVSTAR-GPS), MPGS, Foliage Penetration Radar (FOLPEN), 8" Laser Homing Ordnance, ULCS, UIMS and MIFASS. Prepare the operational test plans for Tactical Combat Operations (TCO) System and other new equipment being considered for procurement by the Marine Corps.

Program Element:65156M Title: Marine Corps Operations Test and Evaluation
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Area: 6 - Defensewide Mission Support

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

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65804N
Title: Technical Information Services
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Budget Activity: 6 - Defensewide Mission Support

(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	1,188	1,456	1,665	1,735	Continuing	Continuing
Z0835	Technical Information Services	1,001	1,201	1,409	1,735	Continuing	Continuing
Z1343	Manpower, Personnel and Training Research and Development Info System	187	255	256	-	-	-

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports Navy Technical Information Program to provide: (a) technical information from American and friendly foreign sources for Navy managers and scientists; (b) Navy planning and requirements information for industry and small business; (c) Navy technical information to centralized DoD and other government agency data bases; and (d) transfer of Navy technology to business and local governments for civil use. Statutes, government policy and regulations such as Public Law 96-480 and Office of Management and Budget Circular A-109 require the Navy to provide information and promote technology transfer as cited. Expands Navy use of industry research results. Develops systems such as the Manpower, Personnel & Training R&D Information System to coordinate, avoid duplication and maximize benefits from RDT&E.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Develop programs and systems to support Research, Development, Test and Evaluation. Restructure and improve programs and services for industry including Navy Acquisition, Research and Development Information Centers at Alexandria, Va., Pasadena, Ca. and Wright-Patterson AFB, Ohio; and counseling services at Congressionally-sponsored Business Opportunity/Federal Procurement conferences to facilitate increased Navy use of industry. Provide information and results of industry research programs to Navy for integration with regular Navy programs. Continue Tri-Service Industry Information Offices which include Navy Acquisition, Research and Development Information Centers and other joint projects with Army, Air Force, Defense Technical Information Center and other government agencies to improve information services. Continue input of Navy information to centralized DoD and other government agency data bases. Increase benefits to Navy from industry research programs. Improve transfer of Navy technology to civilian sector incuding industry and small business through Dept. of Commerce, National Science Foundation, Defense Technical Information Center and Navy programs for state and local governments. Identify and distribute technical information on friendly foreign technology applicable to Navy needs. Implement Manpower, Personnel and Training R&D Information System project; will develop a retrieval capability for all DoD R&D conducted in support of Manpower, Personnel and Training Office. The system is for users ranging from researchers to top-level managers. 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.

Program Element: 65804N
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Technical Information Services
Budget Activity: 6 - Defensewide Mission Support

(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 includes a decrease of 90 in FY 1981 as a result of refinement of list estimates, a FY 1982 total program estimate decrease of 108 as a result of an overall Navy budget reduction and a FY 1983 decrease of 19 resulting from restructuring of technical information services programs.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,008	1,278	1,564	1,684	Continuing	Continuing
20635	Technical Information Services	1,008	1,109	1,306	1,426	Continuing	Continuing
71343	Manpower, Personnel and Training Research and Development Information System	-	169	258	258	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 65804N
DOD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Technical Information Services
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Navy-wide technical information programs managed by the Chief of Naval Material are consolidated in Project Z0835, TECHNICAL INFORMATION SERVICES, of this element. Tasks are oriented to support the goals of Office of Management and Budget Circular A-109 and current national policy for improving research and development and acquisition; Public Law 96-480, (the Stevenson-Wydler Technology Innovation Act of 1980); and, where applicable, the North Atlantic Treaty Organization goals of standardization, rationalization and interoperability are included in information services and products funded by this element. Supported tasks provide significant, current technical information products and services in support of the Research, Development, Test & Evaluation Program and reduce redundancy and costly duplication in the acquisition and dissemination of technical information within Navy and DoD, to state and local governments and to the private sector through the National Technical Information Service and other centralized government agency information sources. This includes information produced by the Navy, DoDs, and American industry. Funds support: (1) information effort essential to technology transfer; (2) provision of planning and requirements information and services to existing and potential Navy contractors, small high technology firms and small business; and (3) increased Navy use of and input to the data banks operated by Dod and by other government agencies. Emphasis is placed on providing information and services that reduce duplication in research and development, maximize the use of advanced technology in weapon systems and increase the base of contractors qualified to participate in technology development and weapon systems acquisition. Fosters Navy use of industry research results to complement Navy-funded R&D programs and increased industry resources on work which helps Navy. Project Z1343, Manpower, Personnel and Training R&D Information System, will establish a system and data base that will provide comprehensive, timely information on Navy (and DoD) Manpower, Personnel and Training R&D so that useful R&D work can be identified by bench level scientists and systematic priorities can be established for competing research objectives. Also, high level planners can obtain an overall picture of resource allocations and relationships among program elements and task areas.

(U) RELATED ACTIVITIES: The Defense Technical Information Center, Army, Air Force, Defense Logistics Agency, and National Aeronautics and Space Administration major information sources and services are related. Office of the Under Secretary of Defense for Research & Engineering coordinates the DoD Technical Information Program of which Project Z0835 is a part. Ad hoc committees established by representatives of the three services and counterparts at other organizations actively and cooperatively seek better techniques and products by sharing useful systems and technology, transferring defense technology to the civil sector, eliminating duplicate or marginal functions and services, and improving essential DoD-wide services. The Navy, Army and Air Force jointly operate Tri-Service Industry Information Offices, potential contractor programs and other services for industry and small business. Policy guidance and procedures are formalized in DOD directives and instructions.

(U) WORK PERFORMED BY: In-House: Naval Ocean Systems Center, and Navy Personnel R&D Center, San Diego, CA; Naval Research Laboratory, Washington, D.C.; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Surface Weapons Center, Dahlgren, VA; Office of Naval Research, Arlington, VA; and Naval Postgraduate School, Monterey, CA.

Program Element: 65804N
DOD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Technical Information Services
Budget Activity: 6 - Defensewide Mission Support

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Three Navy Acquisition, Research and Development Information Center offices in Alexandria, VA, Pasadena, CA, and Wright-Patterson Air Force Base, Ohio, provided Navy planning and requirements information to approximately 800 industry and small business representatives. The Technology Transfer Program continued to expand in response to passage of the Stevenson-Wydler Technology Innovation Act of 1980. The Navy Technology Transfer Fact Sheet monthly distribution reached over 4000 readers in business, government and the military. The Navy participated in technology exchange exhibits and in conferences and seminars related to technology transfer. A network of approximately seventy Technology Transfer Focal Points throughout the Navy performed individual technology transfer functions. Cooperative technology transfer programs with National Science Foundation, Department of Commerce, Defense Technical Information Center , and other agencies were continued. Reporting procedures were modified to meet changing demands and management requirements, and Navy submitted approximately 25,000 Work Unit Summary (DD Forms 1498) reports per year to Defense Technical Information Center in addition to other documents and publications.

2. (U) FY 1982 Program: Programs for industry and small business and for state and local governments will be expanded to reflect the emphasis on programs for small, high technology firms and other requirements of Office of Management and Budget Circular A-109 as well as the policy and requirements of Public Law 96-480. Technical and R&D planning information will continue to be provided to industry through the Navy Acquisition, Research and Development Information Center offices and other centralized data sources. Transfer of Navy technology to the civil sector will be expanded through joint projects for industry with the Department of Commerce, National Science Foundation, patent licensing and Congressionally sponsored workshops. Information exchange with industry will be improved to ensure greater Navy benefits from industry research results. Patent information, technical manuals, handbooks, directories, data and reports will be modified and augmented for use by the private and public sectors. Information from friendly foreign sources will be disseminated. Needed improvements to the DoD data banks operated by Defense Technical Information Center and to other centralized government data banks will be identified. Z1343, Manpower, Personnel and Training Research and Development Information System. Continue to maintain Research Through Engineering Development components of the data base and begin to collect data on studies. Provide technical consultation on development of the new DoD Information System to the Defense Technical Information Center and Logistics Management Institute.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue to redesign and develop systems to support management of Research, Development, Test & Evaluation programs and correlate new systems with Navy reporting and other DoD and Congressional required systems. Continue coordination and dissemination of Navy information through the Navy Acquisition, Research and Development Centers offices and the Defense Technical Information Center to improve information services, including additional services and programs for industry and small businesses. Continue making Navy requirements information available to industry to ensure that industry research and development programs meet Navy and DoD needs. Emphasize constructive technology transfer projects for the public sector. Foster transfer of technology applicable to Navy needs from NATO countries and other foreign sources into the Navy. Hold regional seminars and provide special information products to state and local governments and small and minority business and small, high technology firms. Continue to develop Manpower, Personnel and Training R&D Information System and data

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Program Element: 65804N
DOD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Technical Information Services
Budget Activity: 6 - Defensewide Mission Support

base. Assume responsibility for development of a data base of R&D vs requirements developed by the Logistics Management Institute. Continue consultation with the Defense Technical Information Center and the Logistics Management Institute.

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

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65852N
Title: Atlantic Undersea Test and Evaluation Center
DoD Mission Area: 451 - Major Ranges and Test Facilities
Budget Activity: 6 - Defensewide Mission Support

(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	28,553	35,150	45,658	50,334	Continuing	Continuing
W0541	Atlantic Undersea Test & Evaluation Center	28,553	35,150	45,658	50,334	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Atlantic Undersea Test & Evaluation Center is one of five (Navy) Department of Defense Major range and Test Facility Base activities under the command of and receiving primary support from the Commander, Naval Air Systems Command. This program provides the operational maintenance support, on a continuing basis, for the Navy's only secure and fully instrumented Anti-Submarine Warfare Test and Evaluation Range which is located on Andros Island in the Bahamas. The mission of this facility is to provide technical and scientific assistance for the developmental and operational testing and evaluation of Anti-Submarine Warfare systems undergoing research and development; alignment of electronic, optical, acoustic and navigational systems; and measurement of noise signatures of submarines and surface ships for both tactical and research and development applications. Because of its unique instrumentation and location, U.S. and NATO Anti-Submarine Warfare Forces make use of this facility to conduct surface, air, and sub-surface Anti-Submarine Warfare Readiness Training. This fleet usage permits test and evaluation effort to be conducted simultaneously with fleet readiness training allowing maximum range utilization, improved test and training realism and reduced testing costs chargeable to Anti-Submarine Warfare development projects.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To provide the necessary funding to operate, maintain and improve the Atlantic Undersea Test and Evaluation Center naval facilities and range systems and equipments in support of the developmental and operational test and evaluation of Anti-Submarine Warfare weapon systems and fleet readiness training. The FY 1983 funding, an increase over FY 1982 of 10,508, will support increased contract range operating costs, additional materials and supplies due to increased workload, and essential maintenance and repairs, improvement and replacement of selected City/Life Support Systems, underwater range instrumentation, principally system design and specification development of an Underwater Acoustic Array, and facilities rental payment. The above funding profile includes outyear escalation (exclusive of civilian pay raises anticipated to be effective the first pay period of each fiscal year, beginning on or about 1 October 1982) and encompasses all work or development phases now planned or anticipated through FY 1984 only.

Program Element: 65852N
Title: Atlantic Undersea Test and Evaluation Center
DoD Mission Area: 451 - Major Ranges and Test Facilities
Budget Activity: 6 - Defensewide Mission Support

(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 (-2,994 in FY 1981, -1,544 in FY 1982 and +4,561 in FY 1983) result from refined estimates of costs including escalation. Additionally, FY 1983 was increased by 4,500 in anticipation that the Full Bahamian Facility Rental Charge will be due in that year.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	26,135	31,547	36,694	41,095	Continuing	Continuing
W0541	Atlantic Undersea Test & Evaluation Center	26,135	31,547	36,694	41,095	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS: The facility is operated under the DoD uniform funding policy for major test ranges, wherein direct costs incurred in support of range user are reimbursed by the user. The Fleet, as a user of the Atlantic Undersea Test and Evaluation Center, annually reimburses the activity approximately $5.0 million from the Operations and Maintenance, Navy appropriation for scheduled use of Atlantic Undersea Test and Evaluation Center ranges and facilities.

Program Element: 65852N
Title: Atlantic Undersea Test and Evaluation Center
DoD Mission Area: 451 - Major Range and Test Facilities
Budget Activity: 6 - Defensewide Mission Suppor

(U) DETAILED BACKGROUND AND DESCRIPTION: The requirement for the concept of the Atlantic Undersea Test and Evaluation Center was formulated in 1958. In 1963, an international agreement was executed between the United States and the United Kingdom that provided the use of the Atlantic Undersea Test & Evaluation Center facilities to the United Kingdom in exchange for leased land and operating privileges on Andros Island, Bahamas, in areas contiguous to the Tongue of the Ocean. The Atlantic Undersea Test and Evaluation Center became an Operational Test and Evaluation facility in 1966, and included three distinct ranges: Weapons Range, Fleet Operational Readiness Accuracy Check Site, and Acoustic Range. The Weapons Range provided 3-Dimensional (undersea, surface, air) precision tracking capability in support of Anti-Submarine Warfare Development Test and Evaluation and Operational Test and Evaluation. The Fleet Operational Readiness Accuracy Check Site provides the Fleet with the capability to accurately calibrate and align electronic, optical, acoustic and navigational systems installed on submarine and surface ships. The Acoustic Range provides a highly accurate qualitative and quantitative measurement of the noise signature of submarines and surface ships and other hydroacoustic phenomena. All range facilities including data processing, display, control and communications are located on Andros Island. A Naval Underwater Systems Center detachment at West Palm Beach, Florida, provides logistic support and test planning and scheduling liaison with range users. Program management is performed by the Naval Underwater Systems Center, Newport, RI.

(U) RELATED ACTIVITIES: The Atlantic Undersea Test and Evaluation Center is the principal test and evaluation support activity for Anti-Submarine Warfare systems. Support is provided for the development, test and evaluation of ship and submarine sonars, torpedoes, fire control systems, countermeasure systems, and the submarine silencing program. The range also supports fleet training and the development of submarine and anti-submarine tactics.

(U) WORK PERFORMED BY: In-House: Technical services performed by the Naval Underwater Systems Center, Newport, RI; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Electronics Laboratory Center, San Diego, CA; and Naval Oceanographic Office, Suitland, MD. Contractors: The maintenance and operation of the Atlantic Undersea Test and Evaluation Center is being performed by RCA Service Co., Cherry Hill, NJ, under a cost plus award fee contract which was executed in March 1977 for a basic period of two years with three one year options. Imperial Aviation, West Palm Beach, FL, as a subcontractor to RCA Service Co., provides aircraft and maintenance services.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Base construction, system installation, and checkout was completed in 1966, at which time the Weapons Range became operational and was certified in 1968. The Acoustic Range was operational in 1968 and was certified in 1970. The Acoustic array redesigned in-water electronics were replaced in 1974. The Fleet Operational Readiness Accuracy Check Site was operational in 1969 and was certified by Naval Electronics Laboratory Center in 1970. Planning and design of the Sonar Calibration Range and procurement of key components and software development has been completed. The range development and improvement program emphasized design and experimental work in passive tracking, tracking in the presence of countermeasures, and

automatic tracking on sonobuoys. NIKE-Hercules radar systems acquired as excess from the Army are being modernized, digitized and will replace the older NIKE-AJAX radars to improve in-air tracking capability. Operational and technical evaluation was completed on the Torpedo MK 48 and the Training Certification Program, Proficiency Trials and Prospective Commanding Officer training programs are continuing. Other operations on a continuing basis include: Weapons Systems Accuracy Trials, Submarine Rocket, Operational Test, Independent Ship Exercises, Torpedo Exercises, Homing Mine Mk 60 Mod 0, Fleet Operational Readiness Accuracy Check Site, Range Exercises, and surface ship and submarine noise measurement and signature analysis on the Acoustic Range. The addition of the Target Mk 27 and Mk 30 Underwater Mobile Target capability contributed greatly to the conduct of tests on the Weapons Range.

2. (U) FY 1982 Program: Continue level of effort to provide support for development Test and Evaluation and Operational Test and Evaluation programs: Light Airborne Multi-Purpose System, P-3C Update, Encapsulated Torpedo (CAPTOR), Mine Neutralization Vehicle, Sonar AN/BQQ-5 Technical/Operational Evaluation, S-3A Anti-Submarine Warfare Systems Tests, Mobile Submarine Simulator, Technical/ Operational Evaluation of the Tactical Towed Array System, TRIDENT Command and Control System, and the United Kingdom's STINGRAY System. CONTRAST Trials and high tempo of routine fleet exercises including acceptance trials of SSN 688 class ships. Continue limited range improvement by updating the Range Central Data Processing System by replacing obsolete mechanical plot boards with modern computer-driven displays; procurement of the fourth 750 Kilo-Volt-Ampere Power Generator to replace the fourth of five 500 Kilo-Volt-Ampere Power Generators which are obsolete and uneconomical to operate and maintain and to provide essential additional electrical power support of site #1 to meet the increased electrical load requirements. Provides for the Bahamian Facility Rental Charge.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue level of effort to provide range support and data analysis for Research Development Test and Evaluation, Technical/Operational programs, i.e., Mk 48 Training Certification Program, Proficiency Trials, Weapon System Accuracy Trials, Encapsulated Torpedo, Light Airborne Multi-Purpose System, Patrol Frigate Performance Tests, a submarine acoustic trials and detectability tests, Mine Neutralization Vehicle and Tactical Towed Array Sonar. Continue limited range instrumentation and City/Life Support Systems Modernization and Improvements; initiate procurement for the fifth (FY 1983) Power Generator which will permit reduced maintenance cost and increase the reliability of range electrical power. Additional funding for improvement and modernization will be applied to design and fabrication of an improved Underwater Acoustic Array to measure TRIDENT noise signatures and replace the acoustic array which suffered catastrophic failure in 1979. Provide for the Bahamian Facility Rental Charge, when required.

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

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65854M
Title: Development Center Support
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Budget Area: 6 - Defensewide Mission Support

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

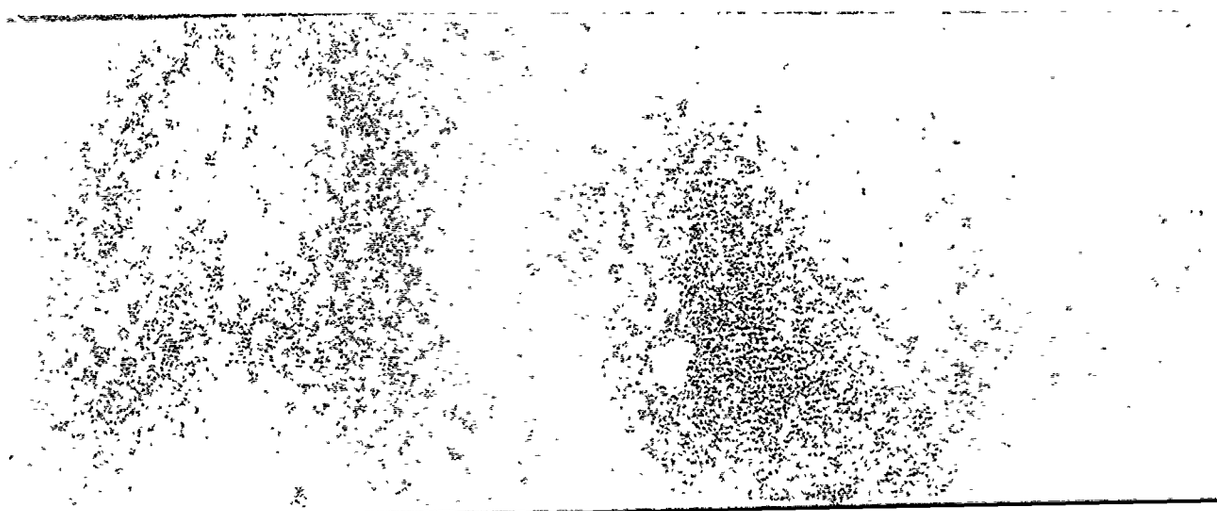
Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3,510	5,422	3,598	3,804	Continuing	Continuing
C0032	Management Support, Marine Corps	3,510	2,822	3,598	3,804	Continuing	Continuing
C1664	M/C Technical Support of Command and Control Systems	0	2,600	*	*	*	*

* Funded in Program Element 26627M, Marine Corps Technical Support of Command and Control Systems in FY 1983 and subsequent years.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element supports the mission of the Commanding General, Marine Corps Development and Education Command which is in part to act as the developer and field representative for the Commandant of the Marine Corps in Research, Development, Test and Evaluation. This included support in FY 1981 for the Marine Corps General Test Facility located at Marine Corps Tactical Systems Support Activity (MCTSSA).

(U) BASIS FOR FY 1983 RDT&E REQUEST: The support of the Marine Corps Development and Education Command in the execution of Management and Support of U.S. Marine Corps programs/projects will be continued. 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 DESCRIPTION SUMMARY: (Dollars in Thousands) The changes between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary: Management Support Marine Corps: FY 1981 decrease of 236 is due to reprogramming to higher priority items. FY 1982 decrease of 80 is due to escalation and inflation decreases and Congressional undistributed reductions. FY 1983 decrease of 2654 is due to transfer of funds to a new project, C1664 Marine Corps Technical Support of Command and Control Systems described in a new Program Element 26627M, Marine Corps Technical Support for Command and Control Systems initiated in FY 1983.



Program Element:65854M
DoD Mission Area: 440 - Technical Integration/Studies and Analyses

Title: Development Center Support
Budget Area: 6 - Defencewide Mission Support

(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	5,385	3,806	5,502	6.252	Continuing	Continuing
C0032	Management Support, Marine Corps	3,868	3,806	5,502	6,252	Continuing	Continuing
C0033	Operational Test and Evaluation (OT&E) Support	1,377*	0	0	0	*	*
C1076	Operational Test and Evaluation Activity (OT&EA)	140*	0	0	0	*	*

* Due to program element restructure, funded in PE 65156M after FY 1980.

Program Element: 65854M
Title: Development Center Support
DoD Mission Area: 440 - Technical Integration/Studies and Analyses
Budget Area: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Project C0032, Management Support, Marine Corps: This project provides 82 civilian (administrative) employees; the administrative support of 715 military and civilian personnel not otherwise provided; the procurement of supplementary (general) developmental and technical services; and certain initial efforts preceeding exploratory development. The Commanding General, Marine Corps Development and Education Command is the field representative of the Commandant of the Marine Corps for all phases of Marine Corps research and development and is responsible for the development for tactics, techniques, doctrine and equipment for use/employment of Marine (and other) forces in amphibious operations.

(U) RELATED ACTIVITIES: None.

(U) WORK PERFORMED BY: In-House: Marine Corps Development and Education Command, Quantico, VA; Naval Postgraduate School, Monterey, CA; and various Naval laboratories. Contractors: Potomac General Research Group, Incorporated, Baileys Crossroads, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Installed additional equipment for the Marine Corps Tactical Systems Support Activity computer consolidation and began software design efforts for the General Test Facility upgrade and consolidation.

2. (U) FY 1982 Program: Continue support of civilian and military personnel at the Marine Corps Development and Education Command engaged in all phases of Marine Corps Research and Development.

3. (U) FY 1983 and FY 1984 Planned Program: Continue support of civilian and military personnel at the Marine Corps Development and Education Command engaged in all phases of Marine Corps Research and Development.

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

5. (U) Milestones: N/A

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65857N
Title: International Research, Development Test and Evaluation Support
DoD Mission Area: 460 - International Cooperative RDT&E
Budget Activity: 6 - Defensewide Mission Support

(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	966	1,679	1,935	2,264	Continuing	Continuing
R0115	Supreme Allied Commander Atlantic Anti-Submarine Warfare Research Centre	516	727	863	969	Continuing	Continuing
R0149	International Cooperative RDT&E	459	952	1,072	1,295	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports effort within the free world to establish and conduct cooperative research, development, test and evaluation of defense weapons and equipment. Supports effort toward achieving standardization and interoperability of naval weapons systems with North Atlantic Treaty Organization and other allies. Provides U.S. share of support for North Atlantic Treaty Organization agency, Supreme Allied Commander Atlantic Anti-Submarine Warfare Research Centre, La Spezia, Italy.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue to support cooperative research, development, test and evaluation programs with allied countries. Respond to emphasis directed at achieving standardization of naval weapons systems with North Atlantic Treaty Organization nations and other allies. Widen scope and increase level of effort in bilateral, multi-lateral, and North Atlantic Treaty Organizarion programs. Expand activities of Data Exchange Agreements to include additional technical areas and foreign participants. Expand activities in Scientist/Engineer Exchange Program to include additional countries. Continue to provide U.S. share of North Atlantic Treaty Organization support for Supreme Allied Commander Atlantic Anti-Submarine Warfare Research Centre. 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 for Project R0149 (-467 in FY 1981 -12 in FY 1982 and -37 in FY 1983) and for Project R0115 (-191 in FY 1981, -9 in FY 1982 in FY 1982 and +4 in FY 1983) are the net result of refined cost estimates including changes in number of international cooperative R&D programs supported, travel cost escalation, inflation and U.S. dollar fluctuations internationally.

Program Element: 65857N
DoD Mission Area: 460 - International Cooperative RDT&E

Title: International Research, Development Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1,121	1,624	1,700	1,968	Continuing	Continuing
R0115	Supreme Allied Commander Atlantic Anti-Submarine Warfare Research Centre	587	707	736	859	Continuing	Continuing
R0149	International Cooperative RDT&E	534	917	964	1,109	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: None.

Program Element: 65857N Title: International Research, Development Test and Evaluation Support
DoD Mission Area: 460 - International Cooperative RDT&E Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Provides for management, direction and execution of Navy's programs for cooperation in international Research and Development. Purpose is to provide for exchange of technical information and participation in cooperative bilateral, multilateral and North Atlantic Treaty Organization Research, Development, Test and Evaluation programs in support of mutual requirements and in furtherance of standardization of weapon systems and equipment among allies. Objectives are: (1) Participation in joint international programs of cooperative Research & Development aimed at harmonized requirements that meet USN technical or operational needs; (2) Maximum exchange of scientific and technical Research and Development information in areas of mutual interest that continue to satisfy U.S. requirements; (3) Support of the North Atlantic Treaty Organization alliance through mutual Research, Development, Test and Evaluation efforts and support of U.S. participation in North Atlantic Treaty Organization Research, Development, Test and Evaluation groups; (4) Support of bilateral and multilateral cooperative Research and Development efforts with Allies; (5) Increase effectiveness of scientific and technical resources of U.S. and Allies by eliminating duplication of effort; (6) Achieve maximum practicable degree of standardization and interoperability of equipment; (7) Forge closer military ties with Allies to make best equipment available and increase alliance capabilities; (8) Provide support to U.S. industry. This program also provides salaries and administrative support for nine U.S. civilian scientific personnel assigned to the Supreme Allied Commander Atlantic Anti-Submarine Warfare Research Centre. The Centre's mission is to provide scientific and technical advice and assistance to the Supreme Allied Commander Atlantic in the field of anti-submarine warfare and to be responsive through the Supreme Allied Commander Atlantic to requirements of North Atlantic Treaty Organization Naval Forces. The Centre also gives scientific and technical assistance to North Atlantic Treaty Organization Nations requesting aid with anti-submarine warfare problems. Program further provides for U.S. liaison support to the Centre and assistance to the Director, as feasible, in obtaining additional U.S. scientists on temporary basis and equipment on request.

(U) RELATED ACITIVITIES: Program Element 65111D, Foreign Weapons Evaluation. Evaluation of foreign weapon systems identified as the result of efforts put forth under this program, Program Element 65857N, International Research, Development, Test and Evaluation.

(U) WORK PERFORMED BY: In-House: Chief of Naval Operations; Office of Naval Research, Arlington, VA; Office of Naval Research Branch Office, London, England; Supreme Allied Commander Atlantic Anti-Submarine Warfare Research Centre, La Spezia, Italy; and various elements of the Department of the Navy as appropriate.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Logistic support provided for cooperative Research, Development, Test and Evaluation programs in Hydracoustics, Sound Propagation, Miniature Inertial Navigation Systems, North Atlantic Treaty Organization Point Defense Missile System, Shallow Water Acoustics, North Atlantic Treaty Organization Azores Fixed Acoustic Range, Deep Diving Research, evaluation of Aircraft and Sensors, Torpedo Development, Planar Array Sonar, Reliable Acoustic Path Sonar, North Atlantic Treaty Organization Hydrofoil, Mobile Acoustic Research System, Sonobuoy Development, North Altantic Treaty Organization

Program Element: 65857N
Title: International Research, Development Test and Evaluation Support
DoD Mission Area: 460 - International Cooperative RDT&E
Budget Activity: 6 - Defensewide Mission Support

NATO Naval Forces Sensor and Weapon Accuracy Check Sites in Europe. Anti-Ship Missile Defense System, Electronic Warfare, Compatibility of Naval Data Handling Equipment, Military Oceanography, Acoustic Propagation, Vertical/Short Take-off Landing Aircraft, Submarine Communications, Ocean Surveillance Improvements, Helicopter Sonar, Ship-Launched Chaff/Infrared Decoy System for North Atlantic Treaty Organization. Explosive Resistant Multi-Influence Sweep System, Infrared Search and Tracking System for Surface Ships, Helicopter Recovery Assist, Secure and Traverse System, evaluation of Canadian Variable Depth Sonar System of U.S. Navy Hydrofoil Craft, evaluation of Norwegian small boat fire control and PENGUIN missile system, cooperative support of OTO MELARA Compact Gun, anti-submarine torpedo cooperation, maritime patrol aircraft interoperability, air-to-air missiles, family of maritime mines, Rolling Airframe Missile System.

2. (U) FY 1982 Program: Continue to support cooperative research and development test and evaluation programs with allied countries. Increase in level of effort associated with participation in North Atlantic Treaty Organization projects, North Atlantic Treaty Organization standardization and rationalization and North Atlantic Treaty Organization Long-Term Defense Program. Expansion of Data Exchange Agreement program to include additional technical ares of mutual interest and foreign participants. Support U.S./Federal Republic of Germany and U.S./Korea Scientist/Engineer Exchange Programs. Expand activities in Scientist/Engineering Exchange Program to include other countries. Support implementation of DoD Memorandum of Agreement on cooperative Research and Development with Israel. Investigate areas of possible Research and Development cooperation with Yugoslavia in support of DoD initiatives. Follow through on North Atlantic Treaty Organization Long Term Defense Program. Supreme Allied Command Atlantic Anti-Submarine Warfare Research Centre project continues at essentially same level of effort.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue to support cooperative research and development, test and evaluation programs with allied countries. Increase in level of effort associated with participation in North Atlantic Treaty Organization projects, North Atlantic Treaty Organization Long Term Defense Program, North Atlantic Treaty Organization standardization and rationalization and expansion of Data Exchange Agreement program to include additional technical areas of mutual interest and additional foreign participants. Intensify efforts aimed at initiatives with North Atlantic Treaty Organization nations and other allies. Under US/Israel Memorandum of Agreement, support scientist/engineer exchange program. Continuation of U.S./Germany, U.S./Korean scientist/engineer exchange programs and addition of programs with other nations. Continuation of Supreme Allied Command Atlantic Anti-Submarine Warfare Research Centre Project.

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

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65859N
Title: Mobile Sea Range
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

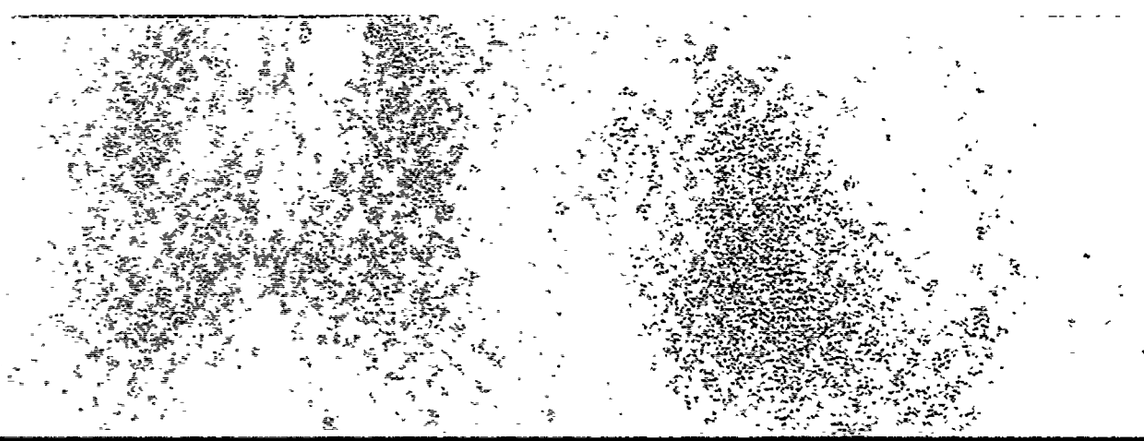
(U) RESOURCES (PROJECT LISTING): (Dollars in Thousands)

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	5,171	7,024	3,229	5,046	Continuing	Continuing
W0169	Mobile Sea Range	5,171	7,024	3,229	5,046	Continuing	Continuing

(U) BRIEF DESCRIPTIVE OF ELEMENT AND MISSION NEED: The Mobile Sea Range Program, formerly the Anti-Ship Missile Defense Test Range Program, will provide the Navy with an open ocean mobile range capability to conduct improved Fleet Readiness Training; evaluate Fleet Tactics and Techniques; and test and evaluate prototype weapon systems in a realistic combat environment. The Mobile Sea Range Project is being accomplished in four separate phases. Air, Surface and Subsurface participants to be simultaneously exercised. This Mobile Sea Range will also support the development and evaluation of tactics and operational procedures.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Complete the development and continue the testing and evaluation of the prototype Cooperative Tracking System, Data Collection System, Blue Force Data Link, and Drone Monitor Override System during scheduled fleet exercises supported by the Mobile Sea Range. Continue Missile Firing Hazard/Safety Pattern studies and analyses to improve range safety and increase Tactical Air Realism during exercises. Complete the development of the prototype Mobile Sea Range documentation to allow the procurement of a second system in the Other Procurement, Navy appropriation in FY 1984/1985. 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 (+1,868 in FY 1981, -140 in FY 1982, and -4,697 in FY 1983); are the results of refined estimates for escalation, funding for a cost overrun by General Dynamics (Electronics) in FY 1981 and deferral of funding that was to provide for inclusion of ASW operations and submarine interplay in Mobile Sea Range Fleet readiness exercises in FY 1983.



Program Element: 65859N Title: Mobile Sea Range
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

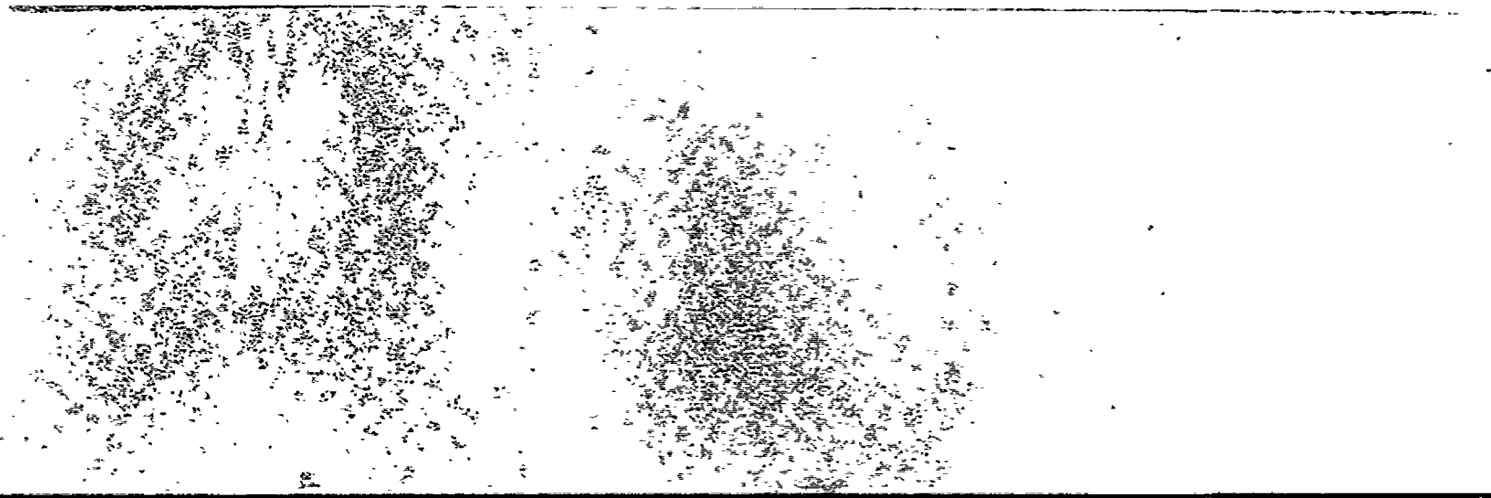
(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: (Dollars in Thousands)

Project No.	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5,085	3,303	7,164	7,926	Continuing	Continuing
W0169	Mobile Sea Range	5,085	3,303	7,164	7,926	Continuing	Continuing

(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
	OPN	600	800	854	20,314	Continuing	Continuing
	Quantity	*	*	*	**		
	O&MN	4,338	4,820	4,560	4,910	Continuing	Continuing
	WPN***	3,000	0	0	0	Continuing	Continuing

* Spare Electronic Parts.
** Spare Electronics Parts and Procurement of Second System.
*** Target Augmentation Equipment.



Program Element: 65859N Title: Mobile Sea Range
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The Mobile Sea Range development was initiated in February 1972 as a project within the Anti-Ship Missile Defense Program. The program was re-designated for improved program identification as the Mobile Sea Range Program. Program goals are to upgrade Fleet Readiness Training to counter the Anti-Ship Cruise Missile Threat; permit the operational test and evaluation of existing and prototype weapon systems; and evaluate present and develop new air, surface and subsurface tactics and procedures in an open ocean environment free of commercial and foreign interference under realistic combat conditions. The development is in four separate but inter-related phases: Phase I: Feasibility Demonstration; Phase II: Anti-Warfare with simulataneous surface-to-air and air-to-air missile engagement; Phase III: Inclusion of Anti-Submarine Warfare with Phase II; and Phase IV: Expansion of the Area Coverage and increase the number of participants for dual-force, offensive/defensive scenarios. To support these separate phases involving aircraft and aerial targets, ships and surface targets and submarines and underwater targets each operating in different environments requires the development of a portable instrumentation capability for measuring, recording and analyzing massive quantities of data on a real time basis. Major systems integration is required of these unique range instruments and systems to permit the Fleet Commanders to conduct large scale at-sea exercises in a heavy electronic warfare environment and to provide a realistic 360 degree air, surface and subsurface threat situation while insuring that range safety procedures and practices are fully enforced. Testing and evaluation of newly developed subsystems and their integration with existing equipments of the Mobile Sea Range is conducted four times each year during scheduled Fleet Exercises.

(U) RELATED ACTIVITIES: The Extended Area Test System development in Navy Program Element 65864N contributed to the development of Participant Instrumentation Packages and Time Space Position Information technology.

(U) WORK PERFORMED: In-House: Naval Air Test Center, Patuxent River, MD; Pacific Missile Test Center, Point Mugu, CA; Naval Ship Weapon Systems Engineering Station, Port Hueneme, CA; Fleet Analysis Center, Corona, CA; Naval Underwater Systems Center, Newport, RI; and Naval Weapon Center, China Lake, CA. Contractor: System Development Corporation, Santa Monica, CA; General Dynamics, Electronics Division, San Diego, CA; Lear Siegler, Inc. Instrument Division, Grand Rapids, MI; Northrop Electronics Division, Palos Verdes, CA; Stanford Research Corporation, Palo Alto, CA; and Science Engineering and Analysis, Arlington, VA; and Systems Engineering Technology Associates Corporation, Falls Church, VA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The first Mobile Sea Range feasibility demonstration (Phase I) was accomplished in June 1975. To date, twenty Fleet Mobile Sea Range exercises have been conducted. Each has contributed to the development efforts of the Phase II. Development efforts completed that have contributed to the Phase II capability are: the initial Data Collection System portion of the Mobile Sea Range Control System and its preliminary at-sea development test; tests demonstrating the tracking accuracy of the Cooperative Tracking System; the Tactical Air Navigation Guidance Augmentation System and threat

simulation devices for the BQM-34S and BQM-74C Target; and peripheral instrumentation necessary for limited data display and collection for Fleet battle group readiness evaluation and reconstruction of Mobile Sea Range exercises. Conducted Phase III at-sea feasibility tests.

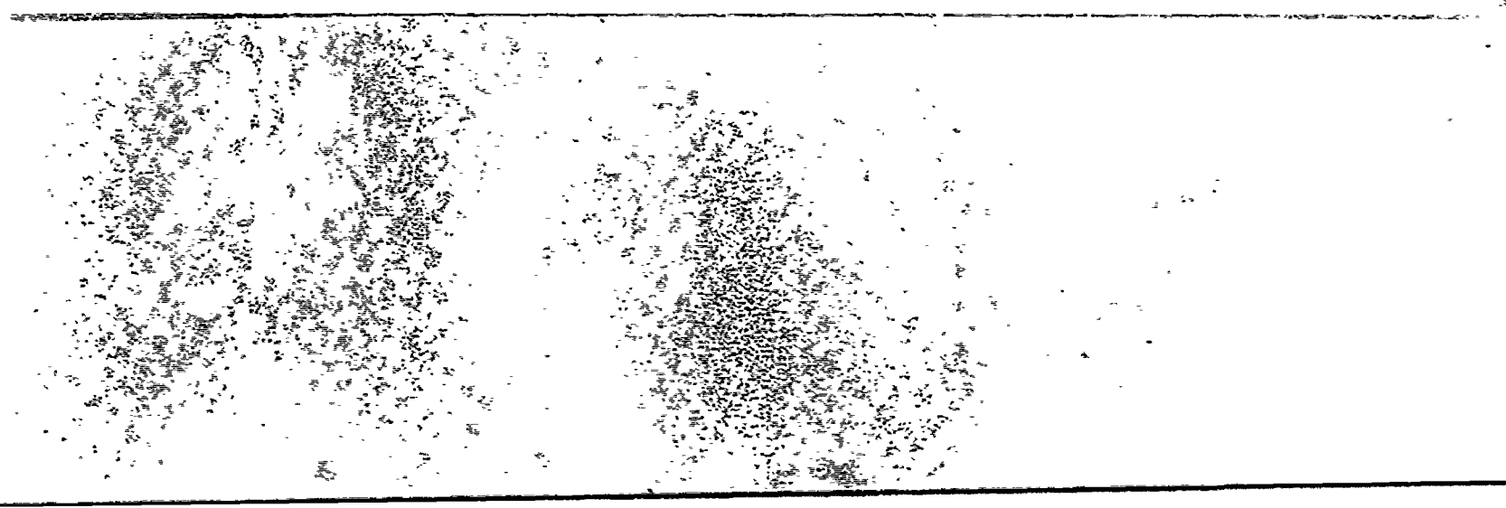
2. (U) FY 1982 Program: Participation in four Mobile Sea Range exercises. The continued development of the initial Cooperative Tracking Systems and Data Collection System to permit Mobile Sea Range exercises to be conducted from any suitably equipped Naval Tactical Data System ship acting as Exercise Operational Tactical Commander and continued development of associated systems integration efforts for the Phase II Control System will be accomplished. Continued development of documentation of systems specification for procurement of the second Mobile Sea Range system. Review Phase III at sea feasibiltiy test data to determine if further development of the ASW capability is warranted.

3. (U) FY 1983 Planned Programs: Continue the development testing of the Hardware/Software Systems and associated interfaces necessary for evaluation and operation of the Mobile Sea Range Phase II capability. Continue development and planned to include Fleet tactics and readiness training requirements into Mobile Sea Range Systems and exercise operations. Completion of the documentation necessary for procurement of the second Mobile Sea Range in the Other Procurement, Navy appropriation will be achieved.

4. (U) FY 1984 Planned Program: Continue participation in four Mobile Sea Range exercises including further development of Phase II instrumentation. Identification of selected technological and engineering efforts to expand the existing Mobile Sea Range capability to permit the exercising of two opposing forces and the allowance for real time scoring and the exercise evaluation of air and surface engagements involving actual and simulated firing under the control of a single exercise director 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. 65861N
Title: RDT&E Laboratory and Facilities Management Support
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(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	48,844	52,159	59,101	66,237	Continuing	Continuing
M0104	Naval Medical Management Support	3,196	4,237	4,649	5,086	Continuing	Continuing
R0129	Office of Naval Research, Research and Development Technical Support	19,954	19,353	21,932	24,157	Continuing	Continuing
R0135	Office of Naval Research Management Support	11,594	13,215	13,294	14,596	Continuing	Continuing
R0150	Independent Research and Development Evaluation	44	44	*	*	*	*
Z0150	Independent Research and Development Evaluation	0	32	80	86	Continuing	Continuing
S0351	Naval Sea Systems Command Management and Support	1,261	734	823	1,504	Continuing	Continuing
S0362	Energy Research & Development Support	1,306	1,400	1,539	1,644	Continuing	Continuing
W0546	Naval Air Systems Command Management and Support	720	2,402	2,678	3,496	Continuing	Continuing
Z0832	Director of Naval Laboratories Management Support	10,003	10,518	13,844	15,357	Continuing	Continuing
X1368	Naval Space Systems Activity, LA	200	224	262	311	Continuing	Continuing
R1547	R&D Plans Support	566	0	0	0	0	566

* Transfers to Project Z0150 in FY 1983.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program which provides for certain programwide management and operations costs at specified Research and Development laboratories and other facilities.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To allow continuation of the effort outlined under "Brief Description of Element and Mission Need." 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 in the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary are as follows: (1) A decrease of 1,625 in FY 1981 is due to refinement of cost estimates and includes reprogramming of 400 from project W0546 to project Y0811, Program Element 65152N, to support a higher priority program. (2) The decrease of 5,515 in FY 1982 and 7,183 in FY 1983 is the result of an overall Navy budget reduction and refinement of cost estimates including inflation.

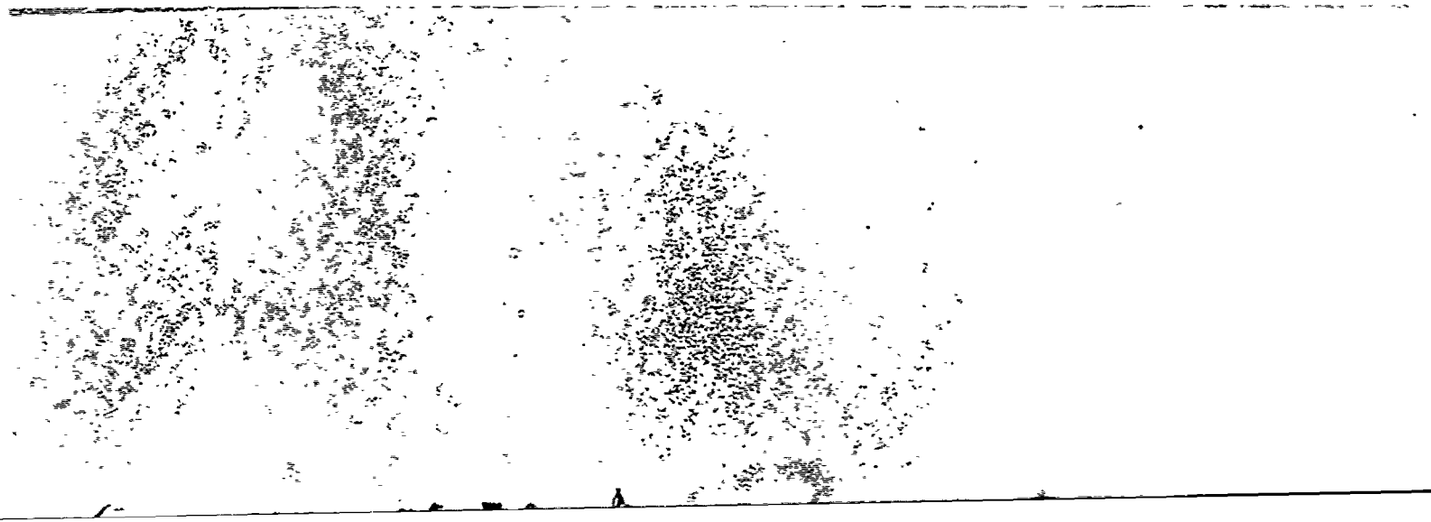
Program Element: 65861N
DoD Mission Area: 471 - General Management Support

Title: RDT&E Laboratory and Facilities Management Support
Budget Activity: 6 - Defensewide Mission Support

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	46,907	50,469	57,674	66,284	Continuing	Continuing
M0104	Naval Medical Management Support	2,718	3,631	4,299	4,459	Continuing	Continuing
R0129	Office of Naval Research, Research and Development Technical Support	19,216	20,087	21,982	24,322	Continuing	Continuing
R0135	Office of Naval Research Management Support	11,216	12,056	13,612	15,741	Continuing	Continuing
R0150	Independent Research and Development Evaluation	39	69	76	82	Continuing	Continuing
S0351	Naval Sea Systems Command Management and Support	1,195	1,271	743	813	Continuing	Continuing
Z0362	Energy Research & Development Support	1,370	1,316	1,418	1,561	Continuing	Continuing
W0546	Naval Air Systems Command Management and Support	1,655	1,275	2,435	3,213	Continuing	Continuing
Z0832	Director of Naval Laboratories Management Support	9,298	9,964	12,882	15,853	Continuing	Continuing
X1368	Naval Space Systems Activity, LA	200	200	227	240	Continuing	Continuing
R1547	R&D Plans Support	-	600	-	-	-	-

(U) OTHER APPROPRIATION FUNDS: Not applicable.



Program Element: 65861N
Title: RDT&E Laboratory and Facility Management Support
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This continuing program provides for programwide management costs and, at Navy RDT&E laboratories and other facilities, for specific management and operation costs not identified to projects under other budget activities. Support provided includes management and operations costs of the Office of Naval Research headquarters and branch offices, and the Navy-wide Patent Program. This element funds tenant activity common support costs under host-tenant agreements, all military personnel support costs, including bachelor officer and enlisted quarters, mess facilities, and similar non-mission operating costs at these Research, Development, Test and Evaluation Navy Industrial Fund and other activities that distribute (charge) overhead costs to customer project funds.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: RDT&E,N laboratories, facilities and other activities described in the project descriptive summaries that follow.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided support for the purpose outlined in "Detailed Background and Description" above.

2. (U) FY 1982 Program: Provide support outlined in "Detailed Background and Description" above.

3. (U) FY 1983 and FY 1984 Planned Program: Support of the programs as outlined under "Detailed Background and Description" will continue.

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

5. (U) Milestones: Not applicable.

Project: R0129 Title: Office of Naval Research Research and Development Technical Support
Program Element: 65861N Title: RDT&E Laboratory and Facilities Management Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This Project provides funding support for the Office of Naval Research Headquarters and the Navy-wide Field Patent Program. Functions performed include: (a) Scientific and technical administration of research and exploratory development programs conducted by the Office of Naval Research, primarily with colleges and universities and the Naval Research Laboratory; (b) Coordination of research and exploratory development for the Navy; (c) Financial management of the Research, Development, Test and Evaluation, Navy appropriation for the Assistant Secretary of the Navy (Research, Engineering and Systems); (d) Contract negotiation of research programs of the Navy and related programs funded by the Defense Advanced Research Projects Agency with colleges and universities; and (e) Administration and control of effort within, or on behalf of, the Department of the Navy relating to patents, inventions, trademarks, copyrights, and royalty payments, and coordination of such efforts with research, development, and procurement activities of the Navy.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Office of Naval Research, Arlington, VA, and seventeen small Patent Staffs located primarily at Navy research and development activities throughout the continental United States. One Patent Staff consisting of two employees is located in London, England.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided support of the Office of Naval Research Headquarters and the Navy-wide Field Patent Program for the purposes outlined in "Detailed Background and Description" above.

2. (U) FY 1982 Program: Continue support as outlined above. Funds will support the Office of Naval Research Headquarters and the Navy-wide Field Patent Program. Previously, 80% of the funds in this project were used for salaries and benefits, with the remainder being used for travel, supplies, Automatic Data Processing operations and related administrative support of the Headquarters and Patents staffs. However, in FY 1979, there was a new requirement to pay the General Services Administration for space rental of General Services Administration controlled buildings occupied by the Office of Naval Research Headquarters and its field activities. Previously, these costs had been paid from the Operation and Maintenance, Navy appropriation. In FY 1982 $966,000 is required for these new rental charges.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue to provide support as outlined above. The apparent increase in funds requested in FY 1983 over FY 1982 is due to increased costs of supplies, communications and related services in FY 1983 and increased Automatic Data Processing operations associated with Research and Development Management Information System support, and to a $2,115,000 understatement of FY 1982 requirements.

Project: R0129 Title: Office of Naval Research Research and Development Technical Support
Program Element: 65861N Title: RDT&E Laboratory and Facilities Management Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0129	Office of Naval Research, Research and Development Technical Support	19,954	19,353	21,932	24,157	Continuing	Continuing

Project: R0135 Title: Office of Naval Research Management Support
Program Element: 65861N Title: RDT&E Laboratory and Facilities Management Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This project supports operations and management costs of the Office of Naval Research, Research and Development programs. It provides for (a) Operations and management of the Office of Naval Research Regional Offices. Continental Regional Offices perform two major functions -- scientific and contract administration. For the Navy, the Scientific Department reviews the independent research and exploratory development programs at Navy laboratories; assists Office of Naval Research Scientific Officers as requested; performs duties as part of a program management team in specialized areas such as lasers; performs liaison duties with the scientific community, such as special visit programs; and investigates, evaluates, and reports on scientific potential within the geographic area. The contract administration function includes a Department of Defense assigned responsibility for the administration of contracts and grants for the Office of Naval Research, other Department of Defense activities, National Aeronautics and Space Administration and all other government agencies with colleges, universities, and certain non-profit institutions located within their respective geographic areas. In addition, quality assurance functions are furnished for Naval Aeronautics and Space Administration contracts by qualified branch office and resident representatives staff personnel; (b) Operations and management of the Naval Ocean Research and Development Activity, which was established on 31 March 1976, and is responsible for research and development, program management, and program assessment of the total ocean science program in the Navy; (c) The Underwater Sound Reference Division of the Naval Research Laboratory; (d) Certain other miscellaneous costs not identified specifically with any operational category such as transportation of research equipment and expenses connected with the Naval Research Advisory Committee.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Ocean Research and Development Activity, Bay St. Louis, MS; Naval Research Laboratory, Washington, DC; Continental Regional Offices located in Boston, MA; Chicago, IL; and Pasadena, CA; an overseas Office in London, England; and an Office of Naval Research Liaison Office (Far East) in Tokyo, Japan.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Supported operations and management costs of the Office of Naval Research, Research and Development programs. Provided for operations and management of the Office of Naval Research Regional Offices, the Underwater Sound Reference Division of Naval Research Laboratory, Naval Ocean Research and Development Activity, and certain other costs such as Naval Research Advisory Committee expenses, and transportation of research equipment.

2. (U) FY 1982 Program: Continued to provide operation and management support of the Office of Naval Research, Research and Development programs.

Project: R0135 Title: Office of Naval Research Management Support
Program Element: 65861N Title: RDT&E Laboratory and Facilities Management Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 and FY 1984 Planned Programs: Continue to provide operation and management support of the Office of Naval Research, Research and Development programs. The increase in funds requested in FY 1983 over FY 1982 is due to increases in operational costs (other than personnel) at each of the Regional Offices and increased costs of miscellaneous services such as Naval Research Advisory Committee expenses.

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0135	Office of Naval Research Management Support	11,594	13,215	13,294	14,596	Continuing	Continuing

Project: Z0832 Title: Director of Navy Laboratories Management Support
Program Element: 65861N Title: RDT&E Laboratory and Facilities Management Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Project provides operational and facility support to Research and Development direct project and tenant effort at the laboratory centers of the Chief of Naval Material. Support provided includes: (a) Headquarters paid functions such as leased lines; (b) start-up, shakedown and certification costs for new technical facilities; (c) Residual costs resulting from the closure or disestablishment of an activity; (d) Costs resulting from reduction-in-force actions at an activity (severance pay/relocation costs); (e) Military Support - this covers the costs associated with assigned military personnel at the laboratory. Maintenance, repair and alterations of military support facilities such as unaccompanied enlisted personnel housing, unaccompanied officers personnel housing, chapels, gymnasiums and other recreational facilities; (f) Tenant Support - the host laboratory provides common services such as personnel, accounting, cyclical maintenance, security, and fire fighting free-of-charge to tenants; (g) Management support for centrally managed inter-laboratory systems such as the Navy Laboratory Computer Network, the Navy Engineering Software Support Group and the Navy Laboratory Interactive Graphics System Support Group.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; Naval Surface Weapons Center, Dahlgren, VA; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Weapons Center, China Lake, CA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Navy Personnel Research and Development Center, San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided support as outlined in "Detailed Background and Description." Non-reimbursable costs for operations at the Naval Weapons Center, in the area of military support, amounts to over $4.6 million per year. The costs to the Naval Ocean Systems Center for support to over one dozen tenants amounts to $900 thousand per year.

2. (U) 1982 Program: Provided support as outlined in "Detailed Background and Description." Total military/tenant support at the laboratories will be about $8.0 million this year. Interactive graphics management support provided by Naval Weapons Center will exceed $1.5 million.

3. (U) FY 1983 and FY 1984 Planned Programs: Funding support for all areas outlined in "Detailed Background and Description" will continue. Additional funding planned for this project is required to fund increasing military and tenant support costs.

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

Project: Z0832
Program Element: 65861N
DoD Mission Area: 471 - General Management Support

Title: Director of Navy Laboratories Management Support
Title: RDT&E Laboratory and Facilities Management Support
Budget Activity: 6 - Defensewide Mission Support

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Z0832	Director of Navy Laboratories Management Support	10,003	10,518	13,844	15,357	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65862N
Title: RDT&E Instrumentation and Material Support
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(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	38,305	43,511	31,707	30,710	Continuing	Continuing
M0105	Naval Medical R&D Command Instrumentation and Material Support	2,149	2,529	2,687	2,901	Continuing	Continuing
R0137	Office of Naval Research Instrumentation and Material Support	9,814	11,048	10,147	8,704	Continuing	Continuing
S0353	Naval Sea Systems Command Instrumentation and Material Support	776	797	889	908	Continuing	Continuing
T0423	Naval Supply Systems Command Instrumentation and Material Support	470	482	539	568	Continuing	Continuing
W0566	Naval Air Systems Command Instrumentation and Material Support	2,877	2,948	2,628	2,781	Continuing	Continuing
X0799	Navy Electronics Systems Command Material Support	230	233	261	274	Continuing	Continuing
X0800	Radiological Control	1,102	1,107	1,266	1,336	Continuing	Continuing
Y0911	Military Construction and Military Personnel Support Equipment	3,002	2,939	3,068	3,296	Continuing	Continuing
Z0833	Director of Naval Laboratories Instrumentation and Material Support	17,885	21,428	10,222	9,942	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program which funds all investment costs and certain support costs at Navy Research, Development, Test and Evaluation Laboratories and Other Facilities.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To continue support as described in "Brief Description of Element and Mission Need." 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.

Program Element: 65862N
DoD Mission Area: 471 - General Management Support

Title: RDT&E Instrumentation and Material Support
Budget Activity: 6 - Defensewide Mission Support

(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 increase of 1,646 in FY 1981 is due to refinement of cost estimates and includes reprogramming of 400 to project Y0811 from Program Element 65861N project W0546. (2) The increase of 1,367 in FY 1982 is a net result of a Congressional add-on of 4,000 for continued support of development of Wallops Island Test Facility, partially compensated for by a reduction of 1,361 as a result of refinement of cost estimates. A decrease of 14,293 in FY 1983 is the result of a change in policy of funding Navy Industrial Fund equipment from appropriated funds to customer surcharge. -12,974 in projects M0105, R0137, S0353, T0423, X0799, X0800, and Y0811 are due to refinement of cost estimates.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	32,610	36,659	42,144	46,000	Continuing	Continuing
M0105	Naval Medical R&D Command Instrumentation and Material Support	2,089	2,167	2,694	2,704	Continuing	Continuing
R0137	Office of Naval Research Instrumentation and Material Support	6,446	8,087	11,779	10,699	Continuing	Continuing
S0353	Naval Sea Systems Command Instrumentation and Material Support	776	782	848	545	Continuing	Continuing
T0423	Naval Supply Systems Command Instrumentation and Material Support	707	473	512	646	Continuing	Continuing
W0566	Naval Air Systems Command Instrumentation and Material Support	2,723	2,836	3,142	3,811	Continuing	Continuing
X0799	Navy Electronics Systems Command Material Support	485	231	248	342	Continuing	Continuing
X0800	Radiological Control	1,005	1,110	1,204	1,430	Continuing	Continuing
Y0811	Military Construction and Military Personnel Support Equipment	2,794	2,890	3,133	3,746	Continuing	Continuing
Z0833	Director of Naval Laboratories Instrumentation and Material Support	15,585	18,083	18,584	22,077	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 65862N
Title: RDT&E Instrumentation and Material Support
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This continuing program provides for all investment and certain support costs at Navy Research, Development, Test and Evaluation laboratories and other facilities. This element funds procurement of general purpose research equipment, instrumentation and support equipment such as machine tools, collateral equipment required to initially outfit facilities constructed under the Navy Military Construction Program, Research, Development, Test and Evaluation photographic collateral equipment required Navy-wide, and miltary personnel support equipment for Research, Development, Test and Evaluation bachelor officer, enlisted and civilian quarters and officer and enlisted messes. Equipment installation costs at Navy Industrial Fund activities, minor construction (up to $100,000) and alteration costs at RDT&E activities, first destination transportation costs of newly procured Research and Development material, and costs levied on certain smaller Research, Development, Test and Evaluation tenant activities by the host activity under host-tenant or interservice support agreements are also paid for by this element.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: Research, Development, Test and Evaluation laboratories and other facilities as indicated on the project descriptive summaries that follow.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided support for the purposes outlined in "Detailed Background and Description" above.

2. (U) FY 1982 Program: Provide support as outlined in "Detailed Background and Description" above.

3. (U) FY 1983 and FY 1984 Planned Program: Continue to provide support as outlined in "Detailed Background and Description" above.

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

5. (U) Milestones: Not applicable.

Project: R0137 Title: Office of Naval Research Instrumentation and Material Support
Program Element: 65862N Title: RDT&E Instrumentation and Material Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This continuing program has provided for general purpose instrumentation and laboratory equipment, and for structural alterations, additions and equipment rearrangements at the Naval Research Laboratory which, under Navy Industrial Fund regulations, may not be financed for recovery as part of operation costs. Beginning in FY 1983, Navy Industrial Fund regulations will permit the purchase of general purpose equipment from customer funds. By this approved change in financial procedure costs of capital equipment purchased by the Industrial Fund activities will be recovered through rates charged to Industrial Fund customers. This program also provides for research equipment, support equipment, minor construction and alterations, and equipment installation at the Naval Ocean Research and Development Activity; and for ADP equipment related to the Research and Development Management Information System at the Office of Naval Research Headquarters.

(U) RELATED ACTIVITIES: The procurement of laboratory equipment and the implementation of minor construction and alteration projects at Naval Research Laboratory and Naval Ocean Research and Development Activity impacts all research and development programs pursued at these laboratories.

(U) WORK PERFORMED BY: In-House: Naval Research Laboratory, Washington, DC; and Naval Ocean Research and Development Activity, Bay St. Louis, MS.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided support for the purposes outlined in "Detailed Background and Description" above. Funds were used for general purpose laboratory and support equipment at Naval Research Laboratory. In addition, a new Electromagnetic Test and Analysis Laboratory building was authorized in the FY 1974 Military Construction, Navy Program, and construction commenced late in calendar year 1974. Funds as required for the analysis, design, software development, materials fabrication and hardware purchase necessary to develop the Central Target Simulation capability associated with the new Electromagnetic Laboratory. Principal items developed over this time included a shielded anechoic chamber, several target sources, and Extended Source Simulator control and display. When completed, it will be the most complete simulation facility of its kind specifically directed towards electronic warfare problems related to anti-missile defense. Funding for collateral equipment for other parts of the new laboratory building is required through FY 1984. In addition, funds were used for general modernization and adaptation of existing NASA laboratory spaces for specific Naval Ocean Research and Development Activity applications. Research and Support equipment acquisitions were concentrated on instrumentation to upgrade acoustic geophysical and oceanographic data acquisition processing and display capabilities. Specific acquisitions included: (1) an interactive digital satellite image processing system for remote sensing oceanography, (2) completion of a Naval Ocean Research and Development Activity laboratory shop support building, (3) a major upgrading of Naval Ocean Research and Development Activity's chemistry laboratory, (4) installation of optical character reader equipment in support of mapping charting and geodesy research

and development, (5) sitework for a temporary leased building to be used to accommodate the personnel increases pending completion of a new Naval Ocean Research and Development Activity Laboratory Building which is in the FY 1982 MILCON Program, and (6) installation of a regulated power supply for the Interactive Digital Satellite Image Processing System.

2. (U) FY 1982 Program: A portion of FY 1982 funds will be used at the Naval Research Laboratory for procurement of highest priority items of general purpose laboratory and support equipment, and for minor construction and equipment installation. Funding will continue to be provided for the Central Target Simulator and collateral equipment. Also, at the Naval Ocean Research and Development Activity general research and support equipment procurement at Naval Ocean Research and Development Activity will be directed towards modernization and replacement of instrumentation for data acquisition, processing, and display. Specific projects include: (1) procurement of digital telemetry and array hardware for the Deep Towed Array Geophysical System, and (2) a satellite receiving system and computer upgrade for the Interactive Digital Satellite Image Processing System.

3. (U) FY 1983 and FY 1984 Planned Programs: To provide support for the purposes outlined above. Funds are required from FY 1981 through FY 1984 to continue system analysis and design, software development materials fabrication and hardware purchase necessary to develop the central target simulation capability associated with the new Electromagnetic Laboratory at the Naval Research Laboratory. Even though costs of general purpose equipment will be recovered through rates charged to Industrial Fund customers, Naval Research Laboratory will have a continuing need for Central Target Simulator and electromagnetic laboratory equipment and equipment installation associated therewith, as well as other special purpose equipment, which in accordance with DoD policy, cannot be charged to customers. Funds will be used at the Naval Ocean Research and Development Activity to acquire state-of-the-art specialized equipment for the measurement of ocean parameters and the analysis of oceanographic data and for replacement of instruments and equipment which is worn out, lost at sea or obsolete. Specific projects include: the construction of a permanent facility for recalibration of current meters, accelerometers, magnetometers and compasses; a digital data recording system, navigation system and pressure test facility for Deep Towed Array Geophysical System; an automatic system for digitizing and processing magnetic geophysical data; a high pressure air compressor to provide high energy pneumatic acoustic sound sources for geophysical and acoustic propagation measurement programs; ocean bottom seismometers; side scan sonar; tunable diode laser spectrometer; an airborne multi-spectral scanner; and a synthetic aperature radar.

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

5. (U) Milestones: Not applicable.

Project: R0137
Program Element: 65862N
DoD Mission Area: 471 - General Management Support

Title: Office of Naval Research Instrumentation and Material Support
Title: RDT&E Instrumentation and Material Support
Budget Activity: 6 - Defensewide Mission Support

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0137	Office of Naval Research Instrumentation and Material Support	9,814	11,048	10,147	8,704	Continuing	Continuing

Project: Z0833 Title: Director of Navy Laboratories Instrumentation and Material Support
Program Element: 65862N Title: RDT&E Instrumentation and Material Support
DoD Mission Area: 471 - General Management Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Project provides for procurement of general purpose research equipment and instrumentation, support equipment such as machine tools, technical collateral equipment required for initial outfitting of approved military construction projects, and non-technical collateral equipment for Research and Development Centers under the Chief of Naval Material. Project also funds all minor construction projects costing less than $100 thousand per project; the cost of installing all general purpose equipment items as well as first destination transportation costs at Chief of Naval Material Research and Development Centers.

(U) Research equipment includes such items as oscilloscopes, digital recorders, signal generators, voltmeters, spectrum analyzers, amplifiers, spectrophotometers, etc. The RDT&E Centers inventory of such technical equipment has a dollar value approximating $300 million. Wear and tear from usage and technical obsolescence necessitates replacement of many items each year. The useful life of technical equipment is estimated to be 7 years.

(U) Instrumentation items are continually required to measure and record test data of various weapons and their components in the media (or simulation of the media) in which they might be expected to function. Typical major facilities requiring specialized instrumentation are: wind tunnels, towing basins, water tunnels, ballistic ranges, and propulsion test facilities. Instrumentation includes such items as plotting tables, test stands, high speed cameras, tape recorders, graphic display terminals, etc.

(U) Military construction collateral equipment procured under this project includes scientific and technically-unique items that are required to outfit a laboratory facility approved in the Navy military construction program.

(U) Project also provides for acquisition of machine tools to support laboratory shops and requirements for prototype production. General purpose non-technical collateral equipment such as office equipment and communication equipment required for internal security or industrial control are also procured with these funds.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Coastal Systems Center, Panama City, FL; Naval Surface Weapons Center, Dahlgren, VA; David W. Taylor Naval Ship Research and Development Center, Bethesda, MD; Naval Ocean Systems Center, San Diego, CA; Naval Underwater Systems Center, Newport, RI; Naval Weapons Center, China Lake, CA; Navy Personnel Research and Development Center, San Diego, CA.

Project: Z0833 — Title: Director of Navy Laboratories Instrumentation and Material Support
Program Element: 65862N — Title: RDT&E Instrumentation and Material Support
DoD Mission Area: 471 - General Management Support — Budget Activity: 6 - Defensewide Mission Support

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Funding support was provided to all Chief of Naval Material R&D Centers for categories outlined in "Detailed Background and Description." In FY 1981 the initial phase of a contract for procurement of Interactive Graphics Systems for the Chief of Naval Material R&D Centers was awarded. Funding support for the Naval Air Development Centers Centrifuge/Simulation Facilities Improvement Program was provided.

2. (U) FY 1982 Program: Funding support was provided for all areas noted in "Detailed Background and Description." The second phase of the interactive graphics systems procurement for the Chief of Naval Material R&D Centers was awarded. Projected productivity increases resulting from the acquisition of these computer aided engineering and documentation systems should result in considerable cost savings to R&D Center customers. Support for the Naval Air Development Center Centrifuge/Simulation Facilities Improvement Program was provided. Development of the Wallops Island Test Facility as directed by Congress was continued.

3. (U) FY 1983 and FY 1984 Planned Program: Effective in FY 1983 items of capital equipment purchased by DOD Industrial Fund activities will be charged to industrial Fund costs of operation through a depreciation charge over the anticipated useful life of the asset. These costs will be recovered through rates charged to Industrial Fund customers. As a result of this new policy, funding under this project has been sharply reduced effective with FY 1983. Funding support will continue for all areas noted in "Detailed Background and Description" for non-Industrial Fund activities such as the Navy Personnel Research and Development Center. Funding will continue to be provided for Industrial and non-Industrial R&D Centers for minor construction projects as well as collateral equipment associated with the initial outfitting of approved Military Construction projects.

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Z0833	Director of Naval Laboratories Instrumentation and Material Support	17,885	21,428	10,222	9,942	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program El[illegible] Title: RDT&E Ship and Aircraft Support
DoD Missio[illegible] Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(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	52,425	60,773	69,847	79,535	Continuing	Continuing
S0354	RDT&E Ships Support	13,960	14,471	15,722	25,256	Continuing	Continuing
W0568	RDT&E Aircraft Flight Hours	11,775	15,237	17,866	19,096	Continuing	Continuing
W0569	RDT&E Aircraft Support	26,690	31,065	36,259	35,183	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This continuing program provides for the operation and maintenance of Research, Development, Test and Evaluation ships and aircraft.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continuing support as described in "Brief Description of Element and Mission Need." 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 19[illegible] Descriptive Summary and that shown in this Descriptive Summary (-377 for FY 1981, -3,407 for FY 1982, and -2,855 for FY 1983) reflects: (1) adjustments for inflation; (2) a small overall decrease in RDT&E,N aircraft flight hours; and (3) a reduction to the number of R&D aircraft which undergo periodic Standard Depot Level Maintenance. This reduction will defer the Standard Depot Level Maintenance of several R&D aircraft from FY 1982 to FY 1983.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	40,926	52,802	64,180	72,702	Continuing	Continuing
S0354	RDT&E Ships Support	9,173	14,100	14,691	14,799	Continuing	Continuing
W0568	RDT&E Aircraft Flight Hours	9,540	10,879	16,480	20,642	Continuing	Continuing
W0569	RDT&E Aircraft Support	22,213	27,823	33,009	37,261	Continuing	Continuing

Program Element: 65863N Title: RDT&E Ship and Aircraft Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This element is a continuing program which provides for the operation and maintenance of ships assigned for the exclusive support of Research, Development, Test and Evaluation projects; the operation and depot maintenance of the Navy Research, Development, Test and Evaluation and Station Flying administrative aircraft; and the material support of Navy aircraft bailed to contractors. Details of these programs are provided in the project descriptive summaries that follow.

(U) RELATED ACTIVITIES: The ship and aircraft supported by this element provide support for all Research, Development, Test and Evaluation projects requiring afloat and airborne developmental and operational test and evaluation.

(U) WORK PERFORMED BY: Research, Development, Test and Evaluation and other activities as indicated on the project descriptive summaries that follow.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided support for the purpose outlined in "Detailed Background and Description" above.

2. (U) FY 1982 Program: Provide support as outlined in "Detailed Background and Description" above.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue to provide support as outlined in "Detailed Background and Description" above.

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

5. (U) Milestones: Not applicable.

Project: S0354 Title: RDT&E Ships Support
Program Element: 65863N Title: RDT&E Ship and Aircraft Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for operation and maintenance of ships used solely in support of the Navy RDT&E program. The major component of the costs associated with this project are those of regularly scheduled ship overhauls. The magnitude of these costs varies from fiscal year to fiscal year depending upon the number and types of ships scheduled for this cyclically required major maintenance. In years when overhauls are scheduled, they constitute the major cost of that year. The remainder of related funds are used for purchase of supplies and equipage, fuel and other petroleum products, repairs and supporting modifications. Part of these costs are fixed and are associated with simply having these ships in the inventory, while a lesser portion varies with the tempo and type of ship operations. The nature of the operations is, in turn, determined by the overall Navy R&D testing program itself.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Navy Ship Research and Development Center, Annapolis, MD; Naval Weapons Systems Engineering Station, Port Hueneme, CA; Naval Ocean Systems Center, San Diego, CA; CINCPACFLT (POL) and Navy Shipyards and TENDERS.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued required support. USS GUDGEON joined the program in FY 1980.

(U) Provided support for NORTON SOUND (AVM-1), DOLPHIN (AGSS-555) and HIGH POINT (PCH-1), and the Oceanographic Research Buoy (ORB) and the Floating Instrumentation Platform (FLIP). Conducted two missile firings against air targets during AEGIS testing. Development of depth survivable radar for submarines aboard DOLPHIN and testing of submarine thermoelectric air conditioning. Final stages of submarine deep towed array. GUDGEON participated in analysis of diesel submarine tactics and employment. HIGH POINT participated in Depressed Towed Array Sonar tests. DOLPHIN tested Satellite Laser Communication and accomplished research on acoustic scattering, ocean turbulence and non acoustic ASW. Established GUDGEON advisory group. Installed vertical launch system on NORTON SOUND.

2. (U) FY 1982 Program: Continue required support. Restricted availability for USS NORTON SOUND (AVM-1), USS DOLPHIN (AGSS-555). High Point (PCH-1), Floating Instrumentation Platform (FLIP) and the Oceanographic Research Buoy) (ORB). Develop five-year R&D program for the nuclear powered ocean engineering and research submarine (NR-1) which will be added to the program in FY 1983.

(U) TECHEVAL and OPEVAL vertical launched Standard Missiles aboard NORTON SOUND. DOLPHIN installation and testing of passive ranging techniques, parametric sonar, stars and non-acoustic ASW (GUDGEON vs back up Submarine). HIGH POINT will participate in the development of high speed mine sweep equipment and high speed collision avoidance and navigation systems.

Project: S0354
Program Element: 65863N
DoD Mission Area: 454 - Other Test and Evaluation Support

Title: RDT&E Ships Support
Title: RDT&E Ship and Aircraft Support
Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 and FY 1984 Planned Programs: Continue required support. Restricted availability for USS NORTON SOUND (AVM-1). Extended restricted availability for USS DOLPHIN (AGSS-555), USS GUDGEON (AGSS-567) has extended availability in FY 1983. Add support for one DE or FF for surface systems projects. As the next step in weapons development, the Battle Group Anti-Air Warfare Coordination system will continue to be tested on NORTON SOUND. Vertical Launch of Standard Missiles will also continue. DOLPHIN will participate in TRIDENT performance testing. GUDGEON will continue work on applications of special acoustic hull coating in ASW mission.

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
S0354	RDT&E Ships Support	13,960	14,471	15,722	25,256	Continuing	Continuing

Project: WQ568 Title: RDT&E Aircraft Flight Hours
Program Element: 65863N Title: RDT&E Ship and Aircraft Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides funding for fuels, oil lubricants, other consumables, and organizational and intermediate level maintenance and material for Research, Development, Test and Evaluation and Station Flying aircraft supporting the Navy's Research, Development, Test and Evaluation effort. This project supports the aircraft flight hours flown only at those Navy Research, Development, Test and Evaluation Activities which are not under the Department of Defense uniform funding policy. The funds provide for pilot training/qualification and support of individual Research, Development, Test and Evaluation projects which require aircraft at these activities. Funding provided each activity is based on flight hour requirements generated by these projects. In contrast, project flight hours flown at Test and Evaluation Activities under the Department of Defense uniform funding policy are reimbursed directly to the activity by the individual project requiring the flight support. Funds are expended based on an average cost per flight hour determined for each type of aircraft.

(U) RELATED ACTIVITIES: Program Element 65863N, Research, Development, Test and Evaluation Ship and Aircraft Support, Project WQ569, Research, Development, Test and Evaluation Aircraft Support - This project funds depot level rework and maintenance of aircraft and major components for Navy Research, Development, Test and Evaluation and Station Flying aircraft located at all Test and Evaluation Activities. It also funds the material support of tailed Research, Development, Test and Evaluation aircraft.

(U) WORK PERFORMED BY: In-House: Naval Air Development Center, Warminster, PA; Naval Coastal Center, Panama City, FL; Pacific Missile Test Center (Non-Range), Pt. Mugu, CA; Naval Research Laboratory, Washington, DC; Naval Weapons Evaluation Facility, Albuquerque, NM; and Naval Air Engineering Center, Lakehurst, NJ.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Funding support for Research, Development, Test and Evaluation flight hours as detailed above was provided for approximately 11,900 hours in FY 1981. The FY 1980 total was 12,050 flight hours.

2. (U) FY 1982 Program: Continue Research, Development, Test and Evaluation flight hour support for a planned total of 11,500 flight hours. The increase in project funding without a relative rise in flight hours is due to higher costs per flight hour. The rise in flight hour costs is due to increased costs for material and fuel and the continued replacement of military personnel by contract labor for organizational and intermediate level maintenance. This project effort will support only the planned flight hour program of 11,500 hours.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue Research, Development, Test and Evaluation flight hour support for a planned total of approximately 11,500 flight hours. Flight hour costs are expected to rise because of increased costs in material and petroleum products. Renewal of aircraft maintenance contracts will also increase flight hour costs. In FY 1983, flight hour requirements will continue at approximately the 11,500 - 12,500 level.

Project: WC568
Program Element: 65863N
DoD Mission Area: 454 - Other Test and Evaluation Support

Title: RDT&E Aircraft Flight Hours
Title: RDT&E Ship and Aircraft Support
Budget Activity: 6 - Defensewide Mission Support

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
WC568	RDT&E Aircraft Flight Hours	11,070	15,237	17,866	19,096	Continuing	Continuing

Project: W0569 Title: RDT&E Aircraft Support
Program Element: 65863N Title: RDT&E Ship and Aircraft Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for depot level rework and repair of Naval Air Systems Command Research, Development, Test and Evaluation and Station Flying Administrative aircraft; rework of engines and other repairable components for these aircraft and material support of aircraft bailed to contractors to support Navy Research, Development, Test and Evaluation effort. Engine and component overhaul costs are based upon flight hours. The overhaul activities are reimbursed for replacement engines and other aircraft components required and utilized while operating the aircraft. Presently, within the three categories of aircraft under Commander Naval Air Systems Command custody there are 141 RDT&E, 53 Station Flying, and 52 bailed aircraft in the inventory. These aircraft are located at 10 various field activities and 16 contractor sites and are utilized for test, evaluation and development of aircraft, aircraft weapons systems, and missiles requiring an airborne platform or static airframe tests.

(U) RELATED ACTIVITIES: Program Element 65863N, Research, Development, Test and Evaluation Ship and Aircraft Support, Project W0568, Research, Development, Test and Evaluation Aircraft Flight Hours - This project provides funding for fuels, oil, other consumables and organizational and intermediate level maintenance for Research, Development, Test and Evaluation and Station Flying aircraft at Navy Research, Development, Test and Evaluation Activities not under the Department of Defense un form funding policy. Program Element 65864N, Test and Evaluation Support - This program element provides funding for support of institutional flight hours at field activities under the Department of Defense uniform funding policy. Project flight hours at these activities are reimbursed by the project directly. However, funding for aircraft rework and component overhaul for aircraft at these activities is provided by this project (W0569).

(U) WORK PERFORMED BY: In-House: Naval Air Rework Facilities at: Alameda, CA; North Island, San Diego, CA; Pensacola, FL; Cherry Point, NC; Jacksonville, FL; Norfolk, VA. Contractors: Aero Corporation, Lake City, FL; Hayes International Corporation, Birmingham, AL; Corpus Christi Army Depot, Corpus Christi, TX.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: This is a continuing project to fund recurring overhaul and rework of airframes and major components (e.g., engines). In FY 1981 funds were expended for the rework of 35 aircraft. Engine and other major component overhaul was provided when required as well as material support to 52 bailed Research, Development, Test and Evaluation aircraft.

2. (U) FY 1982 Program: The rework of 38 aircraft is programmed. Engine and other major component overhaul and material support of bailed Research, Development, Test and Evaluation aircraft will continue at approximately the same level as in FY 1981. Due to the requirement to schedule aircraft rework in advance and the need to maintain a level inventory of flyable aircraft, this work is accomplished at a steady rate throughout the fiscal year.

Project: W0569
Program Element: 65863N
DoD Mission Area: 454 - Other Test and Evaluation Support

Title: RDT&E Aircraft Support
Title: RDT&E Ship and Aircraft Support
Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 and FY 1984 Planned Programs: In FY 1983 the rework of approximately 40 aircraft is required. Engine and major component overhaul and material support of bailed Research, Development, Test and Evaluation aircraft will continue as required. In FY 1984, the rework of approximately 38 aircraft is planned in addition to other continuing support.

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0569	RDT&E Aircraft Support	26,690	31,065	36,259	35,183	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65864N
Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities
Budget Activity: 6 - Defensewide Mission Support

(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	215,579	240,320	274,106	301,613	Continuing	Continuing
W0653	Pacific Missile Test Center	89,354	94,736	104,703	115,672	Continuing	Continuing
W0654	Naval Air Test Center, Patuxent River, MD	67,373	80,100	89,358	98,015	Continuing	Continuing
W0655	Naval Air Propulsion Test Center, Trenton, NJ	16,670	15,702	23,286	26,034	Continuing	Continuing
W0657	Naval Weapons Center Ranges, China Lake, CA	42,182	49,782	56,759	61,892	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The annual institutional funding for the operation, maintenance and test instrumentation and systems improvements at four of the six (Navy) Department of Defense Major Range and Test Facility Base Activities designated by DoD is provided by this program element. The four major range and test facility base activities within this program are the Pacific Missile Test Center, Point Mugu, CA; Naval Air Test Center, Patuxent River, MD; Naval Air Propulsion Center, Trenton, NJ; and the Naval Weapons Center, China Lake, CA. These four Major Range and Test facilities possess the capability and capacity to perform developmental and operational test and evaluation on prototype weapon systems undergoing the Research and Development phase of the Navy's Acquisition Process.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To provide continued institutional funding for the day-to-day operations and maintenance and planned instrumentation and systems improvements at these Navy Major Range and Test Facility Base activities to meet the on-going and projected test and evaluation support requirements of individual Research and Development Weapon System projects prior to their acceptance for service use and initial production. The increased funding of 35,163 thousand over that approved in FY 1982 is due to inflation, non-deferrable major facilities maintenance, planned improvement and modernization of existing test instrumentation systems and equipments and replacement of obsolete, uneconomical to repair test instrumentation and systems. 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 1981 Descriptive Summary and that shown in this Descriptive Summary are +1,633 in FY 1981, -4,662 in FY 1982, -10,442 in FY 1983 which result from refined estimates of costs including escalation.

Program Element: 65864N
Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities
Budget Activity: 6 - Defensewide Mission Support

(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	187,016	213,946	244,982	284,548	Continuing	Continuing
W0653	Pacific Missile Test Center	80,726	89,743	96,862	110,376	Continuing	Continuing
W0654	Naval Air Test Center, Patuxent River, MD	56,117	67,853	82,208	91,258	Continuing	Continuing
W0655	Naval Air Propulsion Test Center, Trenton, NJ	13,360	14,470	15,720	24,000	Continuing	Continuing
W0657	Naval Weapons Center, China Lake, CA	37,013	41,880	50,192	58,914	Continuing	Continuing

(U) OTHER APPROPRIATIONS FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Military Construction, Navy	17,990	8,720	0	8,300	Continuing	Continuing

Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: DoD established the Major Range and Test Facility Base to ensure that a modern, efficient, and cost effective test and evaluation facilities base will be operated and maintained on a continuing basis to meet the test requirements of individual weapon systems undergoing the Research and Development Phase of the DoD Weapon Systems Acquisition Process. This Program Element provides the institutional funding to support the operation, maintenance and improvement and modernization of four U.S. Navy Test & Evaluation activities that provide metric tracking of test objects, command control and destruct for range safety purposes, range clearance, meteorological services, range scheduling, communications frequency interference control and data reduction in support of prototype weapon systems testing and evaluation. The institutional funding pays for: operations and maintenance and improvement and modernization costs of the facilities not chargeable to the user under the DoD Test & Evaluation Uniform Funding Policy. These costs are identified as: administration, air operations, communications, supply, public works, security, fire protection, comptroller, computer services, industrial relations, range instrumentation and general range support equipment, minor construction and alterations, and photographic equipment; and non-mission related recurring operational support for military personnel and tenants. Widespread obsolescence in these test facilities has required a major initiative to replace obsolete labor intensive testing systems with modern, automated, more efficient systems.

(U) RELATED ACTIVITIES: Strategic weapon systems test support is provided to the Western Space and Missile Center, White Sands Missile Range, Kwajalein Missile Range and the Satellite Control Facility. Parachute test support of USAF and National Aeronautics and Space Administration projects, and support of Army turboprop and turboshaft engine environmental testing is also provided. Other Navy Major Range and Test Facility Base activities are shown in Program Element 65852N (Atlantic Undersea Test & Evaluation Center) and 24571N (Atlantic Fleet Weapons Training Facility). The test activities supported under this program are essential for the test and evaluation of all weapons being developed and procured by the Navy. They also support other Services weapons testing, as required.

(U) WORK PERFORMED BY: In-House: Activities listed in "Resources (Project Listing)" plus Naval Air Stations, Point Mugu, CA, and Patuxent River, MD. Contractors: VITRO, Oxnard, CA; Raytheon, Los Angeles, CA; General Dynamics, San Diego, CA; Aeronautics, Santa Barbara, CA; RCA, Los Angeles, CA; Data General, Washington, DC; General Electric, Pittsburgh, PA; Dynalectron Corporation, Santa Barbara, CA; Kentron Corporation, Mission Beach, CA; and eight other major contractors.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Implemented the Uniform Test and Evaluation funding policy to recover direct costs from users. In FY 1981 the direct reimbursables were approximately $189 million for programs such as F-14/PHOENIX, SPARROW III, HARPOON, AEGIS, S-3A, E-2C, HARM, WALLEYE, Fuel-Air Explosive Weapon, Aerial Target Systems Development, synthetic fuels Test and Evaluation, Aircraft Propulsion Evaluation General, Air Breathing Propulsion Systems Technology, F-18, TOMAHAWK, Engine Production Improvements, TRIDENT, cruise missile and Electronic Warfare Simulators. Continued development of: the Extended Area Test

System, Integrated Target Control System, Real Time Telemetry Capability. Centralized Computer System, Secure Telemetry range capability. instrumentation for the China Lake Electronic Warfare Range, and other Improvement and Modernization projects defined in the supporting project level summaries, all of which are instrumentation and systems improvement efforts initiated prior to the approval of the Navy's five-year Improvement and Modernization Plan by the Department of Defense.

2. (U) FY 1982 Program: Continued support as described in "Detailed Background and Description" for programs identified under FY 1981 and Prior Accomplishments. Support the test and evaluation of fuel flexibility/synthetic fuels, the Advanced Short Range Air to Air Missile, AWG-9 Light Airborne Multi-Purpose System III, AV-8B, Vertical Launch System, and numerous Electronic Warfare development projects. The funding provided supports 29 Improvement and Modernization projects totaling $41.2 million. Investment of these funds will arrest the rate of obsolescence and aging of instrumentation systems and equipments at Major Range Test and Facility Base activities. Procurement of Aircraft Test and Evaluation Facility equipments and Central Scientific Computer peripherals at Naval Air Test Center. Replacement of two obsolete meteorological systems at Pacific Missile Test Center. Extended Area Test System transferred to Program Element 65870N.

3. (U) FY 1983 and FY 1984 Planned Program: Continue to provide support as described in "Detailed Background and Description" and for programs previously identified. The increased funding in these years will offset additional operating and maintenance costs caused by inflation, expand contractor services generated by reductions in military and civilian personnel and permit the development and procurement of replacement test instrumentation and systems and the rehabilitation and upgrading of existing test instrumentation and equipment. Continued improvement and modernization efforts will include the continued development of Chesapeake Range and Control System, Time Space Position Information System and the Mission System Test Laboratory at the Naval Air Test Center, Patuxent River, MD, upgrading of Range Surveillance and Tracking Radar, and continued development of the Computer Centralization and Modernization Program at the Pacific Missile Test Center at Point Mugu, CA; continue improvement and modernization of the Electronic Warfare Test Site, the modification of optical and radar tracking instruments to incorporate new Ultra High Frequency timing systems and initiate procurement of technical collateral equipments for the Range Control Center building at the Naval Weapons Center, China Lake, CA.: These Improvement and Modernization efforts are all part of the Navy Five Year Major Range and Test Facility Base Improvement and Modernization Program approved by DoD in FY 1979 to upgrade the capabilities and capacities of these test and evaluation activities to meet the testing requirements of developmental weapon systems having technology of the years 1990 and 2000. New Improvement and Modernization efforts to be initiated in FY 1983 are Cast Glance, Airborne Meteorological Pod and Mobile Frequency Surveillance at Pacific Missile Test Center; Parachute Systems at Naval Weapons Center; Aircraft Systems Test Support Facility and Target Support Systems at Naval Air Test Center.

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

5. (U) Milestones: Not applicable.

Project: W0653 Title: Pacific Missile Test Center, Pt. Mugu, CA
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

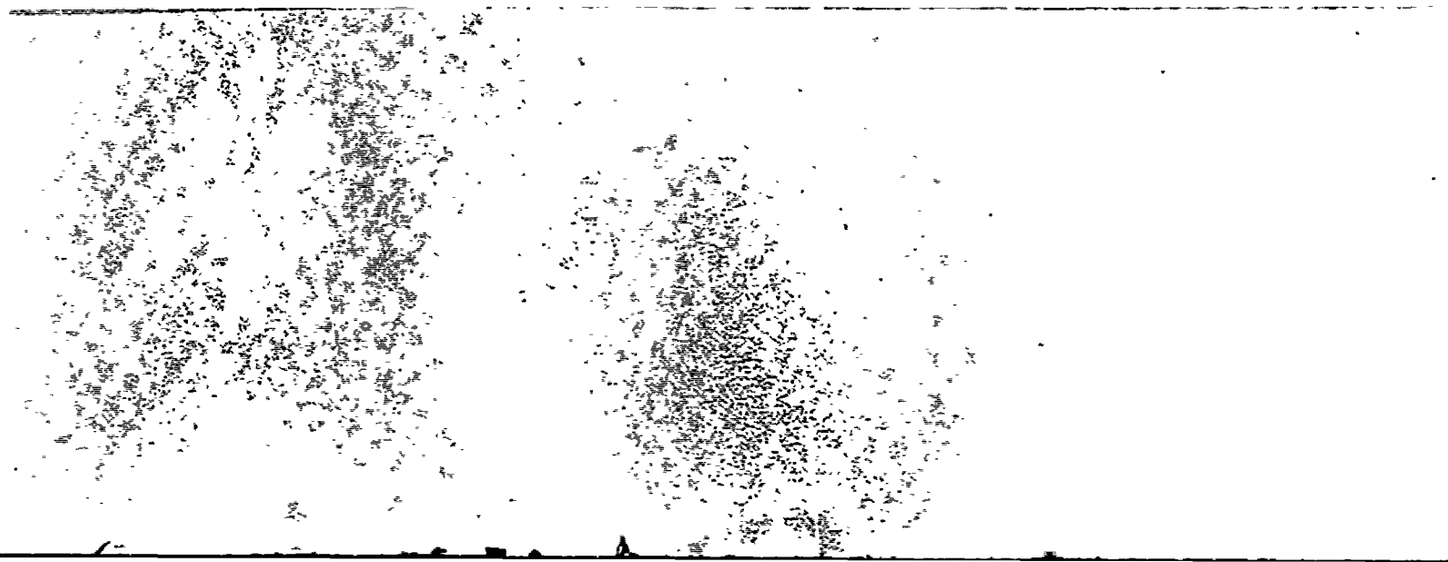
(U) DETAILED BACKGROUND AND DESCRIPTION: The Pacific Missile Test Center is one of four (Navy) Department of Defense Major Range and Test Facility Activities under the command of and receiving primary support from the Commander, Naval Air Systems Command. The mission of the Pacific Missile Test Center is to provide range support for the Department of Defense and other designated government agencies for launching, tracking, and collecting data in guided and ballistic missile, satellite and space vehicle research, development, evaluation and training programs. Range support provided includes: metric tracking of test objects, command control and destruct for range safety purposes, range clearance, meteorological services, range scheduling, communications frequency interference control and analysis, and data reduction for all operations within the cognizance of the Pacific Missile Test Center, including all sea-based missile launches in the Pacific. The Pacific Missile Test Center encompasses the Headquarters, Pt. Mugu, CA; Naval Air Station, Pt. Mugu, CA; Missile Impact Location System at Midway Island. Other instrumentation sites include San Nicholas, Santa Cruz and San Miguel of the Channel Island group off the California coast, plus sites along the California coast. Special range aircraft provide airborne instrumentation platforms and communications and telemetry relay stations to augment shore installations.

(U) RELATED ACTIVITES: Interrange support is provided to the Western Space and Missile Center; White Sands Missile Range; Kwajalein Missile Range, and the Satellite Control Facility on major strategic missile and space programs.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Pt. Mugu, CA; Naval Air Station, Pt. Mugu, CA (including Outlying Field San Nicholas Island); and Pacific Missile Test Center Instrumented Aircraft. Contractors: Dynalectron Corporation, Santa Barbara, CA; Computer Sciences Corporation, Los Angeles, CA; Litton Industries, Los Angeles, CA; Sperry Univac, New York, NY; TRIGA, Inc., Camarillo, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued level of effort to provide range support to 287 programs as defined in the "Detailed Background and Description." In FY 1981, $46.1 million direct reimbursements were received from these programs. Major support was provided for the test and evaluation of tactical systems such as the F-14/PHOENIX, SPARROW III, HARPOON, TOMAHAWK and AEGIS. Range Meteorological Sound System completed in FY 1981. In addition, the development of the Extended Area Test System is continuing which will provide the Pacific Missile Test Center instrumentation capabilities into the open ocean area (extending seaward 250 nautical miles from Pt. Mugu). Continued development of an Integrated Target Control System which will shift target control from the Ultra High Frequency band to the Superhigh Frequency band as directed by the Military Communications Electronics Board. This system will have Navy-wide use. Continued development of the Computer Centralization and Modernization Program.



Project: WO653 Title: Pacific Missile Test Center, Pt. Mugu, CA
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

2. (U) FY 1982 Program: Continue level of effort to provide range support for test and evaluation of weapons systems and provide necessary improvements and modernization of obsolete range systems. Major operational support is being provided for: Tactical weapons systems including the F-14/PHOENIX, TOMAHAWK Cruise Missile, AEGIS and HARPOON; Fleet Tactical Evaluation Exercises; Operational Test and Evaluation Force; Naval Air Squadron (VX-4) Operational Test and Evaluation efforts. Funding for improvement and modernization will be applied to: the Range Display and Control Center; continued development of the Computer Centralization and Modernization Program. Continue conversion of range data communication links to digital systems to permit future encryption for necessary security.

3. (U) FY 1983 and FY 1984 Planned Programs: Continue the level of effort required to provide range support for the test and evaluation of developmental weapon systems and provide for the necessary improvements and modernization of obsolete range systems. The FY 1983 improvement and modernization program provides funding for continued support of Metric Radar Improvements, Central Computer and Modernization Program and Range Display and Control Center. FY 1983 funding allows replacement of worn telemetry recorders and rehabilitation and modification of medium and low gain telemetry antennas to improve performance and extend the operating life. Major operational support will include tactical weapon system test and evaluation including the F-14/PHOENIX; AEGIS; F-15; F-18; TRIDENT; Air Launched Low Volume Ram Jet; Close-in Weapon System; Cruise Missile; and Fleet Tactical Evaluation efforts.

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
WO653	Pacific Missile Test Center	89,354	94,736	104,703	115,672	Continuing	Continuing

Project: W0654 Title: Naval Air Test Center, Patuxent River, MD
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The Naval Air Test Center is one of four (Navy) Department of Defense Major Range and Test Facility Base activities under the command of and receiving primary support from the Commander, Naval Air Systems Command. The mission of the Naval Air Test Center is to perform test and evaluation of the total aircraft including: Aircraft mission system, aircraft system, aircraft mission equipment, subsystems, components, related support systems, and integrated logistic support elements; to provide technical advice and assistance to the Naval Air Systems Command, the Board of Inspection and Survey, other government agencies and contractors; to assist other Research Development Test and Evaluation and Operational Test and Evaluation activities in fulfilling their mission requirements; and to conduct in-house technical projects that develop and document test and evaluation technology. This is a continuing type project which provides funds for: (1) Operations and maintenance costs of the facility not chargeable to the user under the Test and Evaluation Uniform Funding Policy. Support costs chargeable include: Administration, air operations, communications, supply, public works, security, fire protection, comptroller, computer services, and industrial relations; (2) Procurement of investment items essential to the test and evaluation mission of the facility. These items include general test equipment, range instrumentation and general support equipment, minor construction and alterations, and photographic equipment; (3) non-mission related recurring operational support for military personnel and tenants. Support includes military personnel facilities, intermediate maintenance, labor and utilities for fleet squadrons, routine maintenance and repair, administration, air operations, supply and fiscal services, security, fire protection, and industrial relations service. In addition to the fleet aviation squadrons, VQ-4, VXN-8, VX-1, and reserve squadron VP-68, there are twenty-six tenants located at the center.

(U) RELATED ACTIVITIES: Naval Aviation Squadrons VX-1 and VQ-4 involved in testing development aircraft; Surface Effects Tests Facility supporting development of Surface Effects Vehicle Projects, Naval Electronics Systems Command Detachment, Naval Surface Weapons Center.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Pt. Mugu, CA; Naval Air Propulsion Center, Trenton, NJ; Naval Weapons Center, China Lake, CA; Naval Research Laboratory, Washington, DC. Contractor: Southern Maryland Electric, Hughesville, MD; Dynalectron Corporation, Santa Barbara, CA; Grumman Corporation, St. Louis, MO; Universal Fuel, Lexington Park, MD; M. C. Avano Incorporated, Huntington, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued level of effort to provide support as described in "Detailed Background and Description." This project provided operational support to approximately 600 tasks assigned to the Test Center. In FY 1981, $79.0 million in direct reimbursement was received in support of these tasks. Major support of Research, Development Test & Evaluation and Operational Test & Evaluation efforts was provided for the F-14A, F-18, S-3A, E-2C, A-6E aircraft and A-7E Target Recognition Attack Multi-Sensor, CH-53E Helo System, VCX, and electrical and electronics systems for all aircraft. Continue level

Project: W0654
Program Element: 65864N
DoD Mission Area: 451 - Major Ranges and Test Facilities

Title: Naval Air Test Center, Patuxent River, MD
Title: Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

of effort to provide support for test and evaluation of aircraft mission systems, mission-related equipment, subsystems, component and integrated logistics support. Major emphasis will be on the development of techniques and capabilities/facilities for the test and evaluation of airborne computer hardware and software and the evaluation of the reliability and maintainability characteristics of aircraft systems and related computer hardware and software. Continue development of improvement and modernization projects as described above. In addition, funding for improvement and modernization will be applied to the Chesapeake Range Computation and Control System/Time Space Position Information System and Mission Systems Test Laboratory to allow the simultaneous test of multiple aircraft to meet increased workload levels.

2. (U) FY 1982 Program: Continue level of effort to provide support for test and evaluation of all aircraft related systems and provide funds for improvement and modernization of obsolete systems. FY 1982 improvement and modernization continues the development of programs as described above and continues development of a comprehensive Systems Rehabilitation and Modernization program to reduce the backlog of maintenance and repair to essential equipment. Update/refurbish the Chesapeake Test Range with tracking equipment requisite to meet test and evaluation program requirements of the Naval Air Test Center.

3. (U) FY 1983 and FY 1984 Planned Programs: Total direct workload fairly constant, primarily due to such test and evaluation programs as the F-18, AV-8B and Light Airborne Multi Purpose System MK-III. Continuing support to programs as described previously and support of the Research, Development, Test and Evaluation and Operational Test and Evaluation of F-18 and AV-8B aircraft. Continue to update the Tactical Computer and Software Test Lab portions of the Mission Systems Test Laboratories essential for test and evaluation of aircraft computer and software systems and initiate the development of the Manned Flight Simulator (FY 1984).

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0654	Naval Air Test Center, Putuxent River, MD.	67,373	80,100	89,358	98,015	Continuing	Continuing

Project: W0655 Title: Naval Air Propulsion Center, Trenton, NJ
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Naval Air Propulsion Center is one of four (Navy) Department of Defense Major Range and Test Facility Base activities under the command of and receiving primary support from the Commander, Naval Air Systems Command. The mission of the Naval Air Propulsion Center is (1) to test and evaluate air breathing gas turbine propulsion systems, their components and accessories and fuels and lubricants; and (2) to perform applied research and development leading to new propulsion systems and correction of design deficiencies and service problems. This is a continuing project which provides indirect support funds for: (1) operations and maintenance cost of the facility not chargeable to the user under the Test and Evaluation Uniform Funding Policy. Support costs chargeable to this program element include: administration, supply, public works, security, fire protection, resource management, and civilian personnel services. (2) Procurement of investment items essential to the test and evaluation mission of the facility. These items include: general research equipment/instrumentation, test facility Plant equipment, and materials and services for Minor Construction and Alterations.

(U) RELATED ACTIVITIES: Supports engine testing for TOMAHAWK Cruise Missile, F-14 aircraft and Army turboshaft engine environmental testing program.

(U) WORK PERFORMED BY: In-House: Naval Air Test Center, Patuxent River, MD; Naval Air Development Center, Warminster, PA; Naval Ships Research and Development Center, Washington, D.C. Contractors: Public Services Gas & Electric Company, Trenton, NJ; Baron Information System, New York, NY.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued level of effort to support test and evaluation of engine propulsion systems, their components and accessories and support the Fuel Flexibility/Synthetic Fuels Test and Evaluation. Continue replacement program for worn out overage air compressors. In FY 1981, the direct reimbursements were $23.6 million for programs such as: Aircraft Propulsion Evaluation General, Air Breathing Propulsion Systems Technology, F-18 aircraft engine, TOMAHAWK, and Engine Production Improvements. Retubed third gas exhaust cooler.

2. (U) FY 1982 Program: Continue level of effort as described above and continue support of the Fuel Flexibility/Synthetic Fuels Test and Evaluation. Complete procurement/installation of Data Acquisition System for outdoor test site. Continue a preventative maintenance program to reduce the backlog of essential maintenance and repair.

3. (U) FY 1983 and FY 1984 Planned Programs: Provide continued institutional funding support as noted in "Detailed Background and Description" to projects such as those identified in prior years and continue support of engine programs. Accelerate efforts to reduce the backlog of essential maintenance and repair in FY 1983. Procure an additional refrigeration system to meet test requirements for the Cruise Missile System in FY 1983. The estimated FY 1983 workload is: 98% Navy; 1% Army; 0% Air Force; and 1% other.

Project: W0655 Title: Naval Air Propulsion Center, Trenton, NJ
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0655	Naval Air Propulsion Center, Trenton, NJ	16,670	15,702	23,286	26,034	Continuing	Continuing

Project: W0657 Title: Naval Weapons Center Ranges, China Lake, CA
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Naval Weapons Center Range is one of four (Navy) Department of Defense Major Range and Test Facility Base activities under the command of and receiving primary support from the Commander, Naval Air Systems Command. The Naval Weapons Center Range is the principal Navy facility for the test and evaluation of air-to-air and air-to-ground weapons and parachute and aircraft escape systems. This range further provides the principal test facilities for electronic warfare, electronic courtermeasures systems in the Navy, and is equipped to simulate foreign air and sea based electronic warfare systems. This project pays for all test and evaluation costs which cannot be immediately and directly identified with a specific user program. It includes general purpose range instrumentation, minor construction, other investment costs, operating overhead, and general and administrative expenses.

(U) RELATED ACTIVITIES: TRIDENT rocket static firing tests and tests of major naval aircraft weapon systems, electronic warfare systems and ground control missile systems are supported at this activity. This activity also serves as the National Range Facility for the Test and Evaluation of aerodynamic decelerators.

(U) WORK PERFORMED BY: In-House: The test and evaluation ranges (including the Naval Air Facility of the Naval Weapons Center) are operated subatantially by in-house personnel. Contractors: VITRO, Ridgecrest, CA; Raytheon, Ridgecrest, CA; IBM, Los Angeles, CA; General Dynamics, San Diego, CA; Kentron, Mission Beach, CA; General Electric, Los Angeles, CA; Pacific Gas and Electronic, Los Angeles, CA, SCE, Computer Sciences Corporation, Ridgecrest, CA; and other small business maintenance support on remotely piloted vehicles (drones).

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued level of effort to support test and evaluation of weapons development and airborne weapons testing. In FY 1981, $40.2 million in direct reimbursements was received to support weapons test efforts. Major projects supported were Point Defense Integrated Warfare Defense System, TRIDENT, PHOENIX, HARM, WALLEYE, Fuel Air Explosive weapons, and HARPOON. Funding for improvement and modernization was applied to on-going programs such as: Operational Communications, Range Control Center, On-Axis Data System and Electronic Warfare Threat Environmental Simulation facility-Sea Site. Funding was also provided for Systems Rehabilitation and Modernization to reduce the backlog of essential maintenance and repair to test equipment and systems.

2. (U) FY 1982 Program: Continue level of effort to provide support as described in FY 1981 program. Continue support of on-going improvement and modernization programs to meet present/future test and evaluation requirements. Funding will be applied to Systems Rehabilitation and Modernization to continue to reduce backlog of essential maintenance and repair. Funding will provide major investment ($8.9 million) in technical collateral (range instrumentation, computer displays, communication equipments) for the new integrated Range Control Center building whose construction was authorized in FY 1979 MILCON.

Project: W0657 Title: Naval Weapons Center Ranges, China Lake, CA
Program Element: 65864N Title: Test and Evaluation Support
DoD Mission Area: 451 - Major Ranges and Test Facilities Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 and FY 1984 Program: Continue level of effort to support programs listed above. Continue to support on-going improvement and modernization programs and continue to reduce backlog maintenance and repair. Initiate the second buy of the Integrated Target Control System.

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

5. (U) Milestones: Not applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W0657	Naval Weapons Center Ranges	42,182	49,782	56,759	61,892	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65865N
Title: Operational Test and Evaluation Capability
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

(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	5,231	5,770	6,772	6,556	Continuing	Continuing
R0831	Operational Test and Evaluation Force Support	4,955	5,587	5,950	5,770	Continuing	Continuing
R0841	Operational Test and Evaluation Capability	276	183	822	786	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: A continuing support effort to provide Commander Operational Test and Evaluation Force general project related support funding for: (a) Operational Test and Evaluation for reports to the Chief of Naval Operations and the Chief of Naval Material for system acquisition/development decisions; and (b) Operational Test and Evaluation capability improvements in response to initiatives by the Under Secretary of Defense for Research and Engineering and the Congress.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To provide the necessary support required to conduct Operational Test and Evaluation. Costs include those associated with project planning, related travel, instrumentation, data analysis and reduction, reporting Operational Test and Evaluation results, and long range planning for improvements to conduct Operational Test and Evaluation of future weapons systems. 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 (-306 in FY 1981, -84 in FY 1982, and -1,862 in FY 1983) are the result of refined estimates of costs including escalation and overall Navy budget reduction in FY 1983.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4,656	5,537	5,854	8,634	Continuing	Continuing
R0831	Operational Test and Evaluation Force Support	3,740	4,557	5,669	6,351	Continuing	Continuing
R0841	Operational Test and Evaluation Capability	916	980	185	2,283	Continuing	Continuing

Program Element: 65865N
Title: Operational Test and Evaluation Capability
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

(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
	Operation and Maintenance, Navy	618	872	606	680	0	2,776

Program Element: 65865N Title: Operational Test and Evaluation Capability
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This program consolidates funding requirements for support of the Navy's Operational Test and Evaluation Agency. Continuing support is required for expenses associated with Operational Test and Evaluation; specifically, these funds support project-related items such as travel, civilian personnel, supplies, in-house and contract analytic support, data reduction, and instrumentation. Provides improved capability to conduct Operational Test and Evaluation by developing more efficient and effective techniques, and the refinement of long range planning to obtain maximum benefit from available resources.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: A continuing in-house effort performed by the Commander Operational Test and Evaluation Force staff with fleet unit support and limited contractor assistance. In-House: Naval Underwater Systems Center, New London Laboratory, New London, CT; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Ocean Systems Center, San Diego, CA; Naval Air Development Center, Warminster, PA; Fleet Analysis Center, Corona, CA. Contractors: Flight Systems, Inc., Newport Beach, CA; Lockheed Missiles and Space Co., Sunnyvale CA; Value Engineering Co., San Diego, CA; Applied Physics Laboratory, Johns Hopkins University, Silver Spring, MD; ENSCO, Inc., Springfield, VA; Vector Research, Inc., Gaithersburg, MD; Cerberonics, Inc., Falls Church, VA; Delex Systems Inc., Vienna, VA; Mantech, Inc., Livingston, NJ; Analysis and Technology, Inc., N. Stonington, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued support provided to the Navy's Operational Test and Evaluation force as outlined above. Various management improvements were implemented, permitting an increase in Test and Evaluation assigned projects from 372 (in 1975) to more than 706 assigned in 1979. Short and long-term Operational Test and Evaluation improvement initiatives were accomplished to provide improved support to the Congress, Secretary of Defense and Chief of Naval Operations decision-making processes. Completion of implementation of Chief of Naval Operations Instruction 3960.10 (Test and Evaluation) resulted in improved weapons system acquisition management initiatives, such as Fleet Research, Development, Test and Evaluation Support Scheduling System, now nearly complete. Continuation of program to improve Operational Test and Evaluation assessment of logistics supportability of new weapons systems. Implementation of Navy Interim Surface Ship Model which will improve evaluation of Navy acoustic prediction models.

2. (U) FY 1982 Program: Continued support as described above. Continue Operational Test and Evaluation improvement and weapon system acquisition management initiatives as described above. Emphasis will remain on both short-term plan and evaluation report methodology improvement and long-term Operational Test and Evaluation capability improvement.

Program Element: 65865N Title: Operational Test and Evaluation Capability
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

3. (U) FY 1983 and FY 1984 Planned Programs: Continued Operational Test and Evaluation support and improvement as described above. Responsibilities associated with Secretary of Defense, Secretary of the Navy, and Chief of Naval Operations with emphasis on improved material acquisition have been translated into action in recent years. Not only has the number of assigned projects significantly increased, the scope, realism, and competence of Test and Evaluation in each individual project has increased. Additionally, reporting requirements have expanded due to Congressional interest and Department of Defense direction. The increased project assignments of previous years will involve both more detailed planning and actual Test and Evaluation. The associated costs include planning, project-related travel, maintenance of real property, civilian personnel, instrumentation, data analysis and reduction, and evaluation reports.

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

5. (U) Milestones: Not applicable.

Project: R0831 Title: Operational Test and Evaluation Force Support
Program Element: 65865N Title: Operational Test and Evaluation Capability
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This program consolidates funding requirements for support of the Navy's Operational Test and Evaluation Agency. Continuing support is required for miscellaneous expenses associated with Operational Test and Evaluation; specifically, these funds support project related items such as travel, civilian personnel, supplies, in-house and contract analytic support, data reduction, and instrumentation.

(U) RELATED ACTIVITIES: None

(U) WORK PERFORMED BY: A continuing in-house effort performed by the Commander Operational Test and Evaluation Force staff with fleet unit support and limited contractor assistance. In-House: Naval Underwater Systems Center, New London Laboratory, New London, CT; Naval Weapons Center, China Lake, CA; Pacific Missile Test Center, Point Mugu, CA; Naval Ocean Systems Center, San Diego, CA; Naval Air Development Center, Warminster, PA; Fleet Analysis Center, Corona, CA. Contractors: Flight Systems, Inc., Newport Beach, CA; Lockheed Missiles and Space Co., Sunnyvale CA; Value Engineering Co., San Diego, CA; Applied Physics Laboratory, Johns Hopkins University, Silver Spring, MD; ENSCO, Inc., Springfield, VA; Vector Research, Inc., Gaithersburg, MD; Cerberonics, Inc., Falls Church, VA; Delex Systems Inc., Vienna, VA; Mantech, Inc., Livingston, NJ; Analysis and Technology, Inc., N. Stonington, CT.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Continued support provided to the Navy's Operational Test and Evaluation force as outlined above. Various management improvements were implemented, permitting an increase in Test and Evaluation assigned projects from 372 (in 1975) to more than 706 assigned in 1979. Short and long-term Operational Test and Evaluation improvement initiatives were accomplished to provide improved support to the Congress, Secretary of Defense and Chief of Naval Operations decision-making processes. Completion of implementation of Chief of Naval Operations Instruction 3960.10 (Test and Evaluation) resulted in improved weapons system acquisition management initiatives, such as Fleet Research, Development, Test and Evaluation Support Scheduling System, now nearly complete. Implementation of Navy Interim Surface Ship Model which will improve evaluation of Navy acoustic prediction models.

2. (U) FY 1982 Program: Continued support Operational Test and Evaluation support as described above.

3. (U) FY 1983 and FY 1984 Planned Programs: Continued Operational Test and Evaluation support as described above. Responsibilities associated with Secretary of Defense, Secretary of the Navy and Chief of Naval Operations emphasis on improved material acquisition have been translated into action in recent years. Not only has the number of assigned projects significantly increased, the scope, realism, and competence of Test and Evaluation in each individual project has increased. Additionally, reporting requirements have expanded due to Congressional interest and Department of Defense direction. The increased project

Project: R0831 Title: Operational Test and Evaluation Force Support
Program Element: 65865N Title: Operational Test and Evaluation Capability
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

assignments of previous years will involve both more detailed planning and actual Test and Evaluation. The associated costs include planning, project-related travel, maintenance of real property, civilian personnel, instrumentation, data analysis and reduction, and evaluation reports.

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

5. (U) Milestones: Not Applicable.

6. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
R0831	Operational Test and Evaluation Force Support	4,955	5,587	5,950	5,770	Continuing	Continuing

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65870N
Title: Strategic Systems Test Support
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

(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	4,647	19,046	17,658	8,616	33,608	83,575
W1359	Strategic Systems Test Support	4,647	19,046	12,194	3,186	1,970	41,043
W1647	Extended Area Test System	*	**	5,464	5,430	31,638	42,532

* Funded in Program Element 65864N
** Funded in W1359.

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports the conversion of four existing Navy P-3 type aircraft to serve as mobile instrumentation platforms capable of acquiring ballistic missile reentry vehicle telemetry and performing missile impact scoring in broad ocean areas as required to support testing of TRIDENT, MX and other strategic weapons systems, as well as tactical range requirements at the Pacific Missile Test Center. The use of aircraft has been determined to be more cost effective than replacement of range instrumentation ships.

(U) BASIS FOR FY 1983 RDT&E REQUEST: To provide the necessary funding for mobile instrumentation platforms (aircraft) to replace the range instrumentation ship USNS WHEELING and for the procurement and installation of new equipments and instrumentation on the aircraft. 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 (-7,897 in FY 1982 and -10,542 in FY 1983) are a result of a restructuring of the program. The FY 1982 Descriptive Summary was based on development of a replacement range instrumentation ship. The high operating cost of such a ship and limited capability for terminal area support of strategic missile tests (adequate for telemetry but not capable of accurate impact scoring of multiple reentry vehicles) has lead to a more cost effective approach using instrumented aircraft which can support both telemetry and missile impact scoring. The decrease of 43 in FY 1981 results from refined cost estimates.

Program Element: 65870N
Title: Strategic Systems Test Support
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	4,690	26,943	28,200	9,500	69,333
S1359	Test Range Instrumentation Ship Development	0	4,690	26,943	28,200	9,500	69,333

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 65870N Title: Strategic Systems Test Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The range instrumented ship USNS WHEELING which provided terminal area and other support to missile projects in the Pacific Ocean area has been decommissioned. Studies indicated that a service life extension program would not be cost effective so the ship was retired from service. The acquisition of a new mobile range instrumentation platform is required to acquire telemetry data from tactical missile testing and from strategic missile reentry vehicles and to provide accurate missile impact scoring in broad ocean areas. It is planned to convert four existing Navy P-3 type aircraft for this purpose and to base them at the Pacific Missile Test Center, Pt. Mugu, CA.

(U) RELATED ACTIVITIES: This project will support the Pacific Ocean testing of TRIDENT, MX, and other strategic missile programs. When not used for strategic systems test support, these aircraft will be used to extend the Pacific Missile Test Center's instrumentation capability 250 nautical miles over the horizon for more realistic missile testing away from shore.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center. Contractors: General Dynamics, Raytheon, Hayes, and Palisades Geophysical Institute.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: An advanced phased array telemetry antenna for the P-3 aircraft under development by Raytheon for the Pacific Missile Test Center will be modified for reentry vehicle telemetry acquisition and a Sonobuoy Missile Impact Location System already developed and in use in the Atlantic (VX-1 Squadron) will be incorporated into the range instrumentation aircraft. When not in use for strategic systems test support, these aircraft will be used for more realistic testing of missiles away from land areas by Pacific Missile Test Center using other capabilities for cooperative tracking and target/drone control which will also be incorporated in these P-3 aircraft.

1. (U) FY 1981 and Prior Accomplishments: New start in FY 1981. Development of Sonobuoy Missile Impact Location System capability in two of the P-3 aircraft was initiated.

2. (U) FY 1982 Program: The development prototype telemetry antenna will be installed in a P-3 aircraft for test and evaluation and support of tactical missile tests at Pacific Missile Test Center. Long lead procurement of Sonobuoy Missile Impact Location System equipment and preparation of design changes for the improved telemetry antenna will be completed to incorporate Right Hand-Left Hand circular polarization diversity combining and to improve the vertical aperture of the antenna.

3. (U) FY 1983 and FY 1984 Planned Programs: In FY 1983 the installations of the Sonobuoy Missile Impact Location System equipment in two P-3 aircraft will be completed to permit support of the TRIDENT test program and the fabrication of the improved telemetry antennas for the prototype aircraft will commence. In FY 1984 the aircraft modifications and telemetry antenna installations will be completed in the aircraft.

Program Element: 65870N
Title: Strategic Systems Test Support
DoD Mission Area: 454 - Other Test and Evaluation Support
Budget Activity: 6 - Defensewide Mission Support

4. (U) Program to Completion: Procurement of two addditional improved telemetry antennas and modifications of two P-3 aircraft to accept them will be funded in FY 1985-87.

5. (U) Milestones: Not applicable.

Project: W1359 Title: Strategic Systems Test Support
Program Element: 65870N Title: Strategic Systems Test Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The range instrumented ship USNS Wheeling which provided terminal area and other support to mission projects in the Pacific Ocean area has been decommissioned. Studies indicated that a service life extension program would not be cost effective so the ship was retired from service. The acquisition of a new mobile range instrumentation platform is required to acquire telemetry data from tactical missile testing and from strategic missile re-entry vehicles and to provide accurate missile impact scoring in broad ocean areas. It is planned to convert three existing Navy P-3 type aircraft for this purpose and to base them at the Pacific Missile Test Center, Pt. Mugu, CA.

(U) RELATED ACTIVITIES: This project supports the Pacific Ocean testing of TRIDENT, MX, and other strategic missile programs. When not required for strategic support these aircraft will be used to augment current Pacific Missile Test Center range capability and extend it seaward 250 nautical miles, allowing for more realistic over-the-horizon missile testing away from shore. Prototype system of the tactical version was developed in 65864N and project W1647 in this element.

(U) WORK PERFORMED BY: In-House: Pacific Missile Test Center, Pt. Mugu, CA; Contractors: To be determined.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: New start in FY 1981. A procurement for a Sonobuoy Missile Impact Location System already developed and in use in the Atlantic (VX-1 Squadron) was initiated for two P-3 range instrumentation aircraft.

2. (U) FY 1982 Program: The prototype telemetry antenna upgraded design will be completed, incorporating right-hand - left-hand circular polarization diversity combining and improved vertical aperture. Long lead procurement of the Sonobuoy Missile Impact Location System equipment will complete.

3. (U) FY 1983 Planned Program: Sonobuoy Missile Impact Location Systems will be installed in two P-3 aircraft initiated to permit support of the TRIDENT test program. Fabrication of the improved telemetry antenna for the upgraded antenna prototype will commence.

4. (U) FY 1984 Planned Program: Aircraft modifications and telemetry antenna installation will be concluded in the prototype.

5. (U) Program to Completion: Procurement of two additional improved telemetry antennas and two P-3 aircraft modifications for a total of three aircraft capable of strategic and tactical support.

Project: W1359 Title: Strategic Systems Test Support
Program Element: 65870N Title: Strategic Systems Test Support
DoD Mission Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

6. (U) Milestones:

Milestones:	Date
1. Antenna Design Study	June 1982
2. Interim Sonobuoy Missile Impact Location System	Early FY 1983
3. Prototype Testing	FY 1984
4. Full System Capability	FY 1987

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1359	Test Range Instrumentation Ship Development	4,647	19,046	12,194	3,186	1,970	41,043

Project: W1647 Title: Extended Area Test System
Program Element: 65870N Title: Strategic Systems Test Support
DoD Missile Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This project completes development of the Extended Area Test System capable of tactical support. Use of an airborne platform to satisfy requirements for an extended range area will allow the cost-effective capability to support realistic tactical missile testing at the Pacific Missile Test Center.

(U) RELATED ACTIVITIES: As a follow-on to this effort, an upgraded antenna and Strategic Missile Impact Location System will be developed and procured to support the Pacific Ocean testing of TRIDENT, MX, and other strategic missile programs. When not required for strategic support, these aircraft will be used to augment current Pacific Missile Test Center capabilities and extend it to 250 nautical miles.

(U) WORK PERFORMED BY: IN-HOUSE: Pacific Missile Test Center, Pt. Mugu, CA; Contractors: Raytheon, General Dynamics.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Funded in Program Element 65864N. Prototype system developed and testing initiated.

2. (U) FY 1982 Program: Prototype antenna system factory tested installed on P-3 as an airborne instrumentation station and flight tested.

3. (U) FY 1983 Program: Completion of antenna and telemetry testing and acceptance of entire system. Program complete.

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

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

6. (U) Milestones:

Milestones:	Date
1. Antenna Factory Test	February 1982
2. P-3 Flight Test	June 1982
3. System Acceptance	Mid-1983

Project: W1647 Title: Extended Area Test System
Program Element: 65870N Title: Strategic Systems Test Support
DoD Missile Area: 454 - Other Test and Evaluation Support Budget Activity: 6 - Defensewide Mission Support

7. (U) Resources:

Project No.	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
W1647	Extended Area Test System	*	**	5,464	5,430	31,638	42,532

* Funded in Program Element 65864N
** Funded in W1359

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65872N
Title: Productivity Improvement
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(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	10,490	4,432	2,350	Continuing	Continuing
Z1457	Productivity Improvement	0	10,490	4,432	2,350	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a new program which provides for productivity enhancing capital investments at specified research and development laboratories. These investments are used to develop, purchase and/or implement improved equipment or procedures to enhance the productivity of the workforce at the R&D laboratories and other organizational components. Investments are expected to provide a payback in four years or less.

(U) BASIS FOR FY 1983 RDT&E REQUEST: The Navy's R&D laboratories identified more than 50 million dollars in investment opportunities for competition in the Navy's Cost of Ownership Reduction Investment Program for FY 1982. The projects were evaluated in accordance with Cost of Ownership Reduction Investment Program criteria. A refined set of projects were integrated in priority order with other Navy projects and a final project selection was made. Of these, five projects were selected. In addition, four projects were selected under the Office of Secretary of Defense Productivity Investment Fund. Additional projects were developed and selected under the FY 1983 Cost of Ownership Reduction Investment Program. 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: The change between the funding profile shown in the FY 1982 Descriptive Summary and that shown in this Descriptive Summary is a 6,018 decrease in FY 1982 as a result of Navy reduction to the FY 1982 Budget.

(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	13,508	TBD	Continuing	Continuing
Z1457	Productivity Improvement	0	0	13,508	TBD	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 65872N
Title: Productivity Improvement
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for productivity enhancing capital investments at research and development laboratories. Inadequate productivity growth is much cause for concern on a national scale. A major goal within the Navy is an accelerated effort to improve productivity; and substitution of capital investments for labor costs is a primary means of achieving that goal under the Navy's Cost of Ownership Reduction Investment Program. One of the major findings of the Laboratory Management Task Force under the Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology) is that obsolescence in laboratory plant and equipment is impacting on productivity and increasing operating costs. The Laboratory Management Task Force is recommending a sound investment program for the Defense laboratories as a critic element in our ability to meet the severe technological challenge of the Soviet Union. The Office of the Secretary of Defense sponsored Productivity Investment Fund and the Navy's Cost of Ownership Reduction Investment Program provides an opportunity for the laboratories to provide funding for high payback investment opportunities. Most of these projects provide a substantial manpower savings and they all project an attractive return on investment.

(U) RELATED ACTIVITIES: Not applicable.

(U) WORK PERFORMED BY: In-House: Naval Underwater Systems Center, Newport, RI; Naval Weapons Center, China Lake, CA; David W. Taylor Ship Research and Development Center, Bethesda, MD; Navy Personnel Research and Development Center, San Diego, CA; Pacific Missile Test Center, Pt. Mugu, CA; Naval Air Development Center, Warminster, PA; Naval Surface Weapons Center, Dahlgren, VA; and the Naval Ocean Systems Center, San Diego, CA.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: New Start in FY 1982.

2. (U) FY 1982 Program: Contracts will be awarded for various equipment procurements with delivery and installation of equipment in FY 1982 or early FY 1983. Project management plans have been prepared and preliminary actions taken to provide timely completion of projects in FY 1982.

3. (U) FY 1983 and FY 1984 Planned Program: New proposals have been submitted to continue support of this program.

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

5. (U) Milestones: Not applicable.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 65873N
Title: Long Range Planning Support
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(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	Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	—	900[a/]	1,281	1,311	Continuing	Continuing
R1547	R&D Plans Support	—	100[a/]	100	100	Continuing	Continuing
R1562	Warfare Planning Support	—	400[a/]	881	911	Continuing	Continuing
R1694	Technology Assessment Support	—	400[a/]	300	300	Continuing	Continuing

a/ Funded in Program Element 65861N, project R1547 in FY 1982, reflected here for comparability.

(U) Brief Description of Element and Mission Need: This program, a new start during FY 1982, provides analytical support to the Chief of Naval Operations for developing long range planning goals and objectives and R&D planning support.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Supports Planning and Technology assessment to develop more effective RDT&E programs. The Warfare Planning Support project is to initiate and develop long term Navy goals and objectives in response to CNO personal tasking, including broad planning criteria and statements of required functional capability. 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: Not applicable; new program element.

(U) FUNDING AS REFLECTED IN THE FY 1982 DESCRIPTIVE SUMMARY: Not applicable; new program element.

Program Element: 65873N
Title: Long Range Planning Support
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: The R&D Planning Project (R1547) provides support to planning a more effective RDT&E program. It will analyze requirements and planned efforts to identify gaps and overlaps in the Navy program and assess the operational implications of scientific advances and technology innovations to aid in program selection processes. The Warfare Planning Support project (R1562) is to initiate and develop long term Navy goals and objectives in response to CNO personal tasking including broad planned criteria and statements of required functional capability. Objective is to build an integrated, Navy planning process which recognizes key segments of Navy's environment, including potential enemy threats, assesses the organization's strengths and weaknesses in coping with threats, and illuminates strategic choices available to ensure maintenance of a strong, competitive position in the future. Performance of this function will require analyses and studies to articulate relevant environmetal sectors, e.g., economics, logistics, manpower, and to assess alternative proposals for use of naval forces.

(U) RELATED ACTIVITIES: Program Element (PE) 65154N, Center for Naval Analyses, Navy;

(U) WORK PERFORMED BY: In House: None. Contractors: Only potential contractor identified to date for Warfare Planning Support project is Hudson Institute, Croton-on-Hudson, NY. Others to be determined through source selection process.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

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

2. (U) FY 1982 Program: Not applicable.

3. (U) FY 1983 and FY 1984 Planned Program: Assessment of RDT&E requirements compared to planned efforts. Conduct assessments of the technology implication of new starts and programmatic initiatives to aid in ongoing programmatic decisions. Analyses of Long Range Political, Economic, and Resources Environment; Soviet Naval Trends; Naval Warfare in the Year 2000; Evaluation of Long Range Naval Concepts; Long Range Alternative Strategies.

4. (U) Program to Completion: Continuing program.

FY 1983 RDT&E DESCRIPTIVE SUMMARY

Program Element: 88751N
Title: Civilian Education Programs
DoD Mission Area: 471 - General Management Support
Budget Activity: 6 - Defensewide Mission Support

(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	615	1,000	1,157	1,378	Continuing	Continuing
R0127	Navy-Wide Long-Term Training	615	1,000	1,157	1,378	Continuing	Continuing

(U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Provides support for civilian training and education programs of more than 120 consecutive full-time work days. This Program commenced in FY 1966 and is designed to increase individual professional and managerial competence, as well as provide funds to meet Office of Personnel Management and Department of Defense mandated educational requirements.

(U) BASIS FOR FY 1983 RDT&E REQUEST: Continue to provide support for a comprehensive training and education program, to support travel and replacement salary costs, to provide sufficient funding for proposed Department of Defense Executive Fellows participation, and to participate in the Department of the Navy Federal Executive Development Program. 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 (-255 in FY 1981, -307 in FY 1982, and -347 in FY 1983) is attributable to refinement of estimates including escalation indices.

(U) FUNDING AS REFLECTED IN 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	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	728	870	1,307	1,504	Continuing	Continuing
R0127	Navy-Wide Long-Term Training	728	870	1,307	1,504	Continuing	Continuing

(U) OTHER APPROPRIATION FUNDS: Not applicable.

Program Element: 88751N
DoD Mission Area: 471 - General Management Support

Title: Civilian Education Programs
Budget Activity: 6 - Defensewide Mission Support

(U) DETAILED BACKGROUND AND DESCRIPTION: Navy-Wide Long-Term Training is off-the-job full-time training (other than in apprenticeship, cooperative education, and management intern programs) which consists of more than 120 consecutive full-time work days, and which may be accomplished in either government or non-government facilities. The Program commenced in FY 1966 under Deputy Secretary of Defense Memo of 13 May 196[illegible], (Subj: Establishment of a Pool of Spaces and Funds for Long-Term Civilian Training Program). The program policy and standards are now incorporated in DoD Instruction 1430.5 of 26 June 1978. Consistent with the significant changes in their responsibilities, employees will be assigned to a comprehensive training and education program of more than 120 days in length. This will provide the employee with appropriate motivational and developmental opportunities beyond the scope of the customary programs of short duration, as well as provide for employees trained and qualified to meet Naval activity mission requirements. The level of individual competence and professional knowledge will be increased to meet mission requirements.

(U) RELATED ACTIVITIES: Through the medium of coordinated effort, the application of this training program forms the nucleus of manpower development Navy wide. Attained knowledge and associated professional capabilities serve as an essential base to manpower management. Qualitative factors are interfaced with quantitative factors in relationship to the development of the employee which provides a better employment base.

(U) WORK PERFORMED BY: Various government and non-government educational institutions throughout the country.

(U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Provided supports at reduced levels to various Naval activities for tuition, travel, and replacement salary costs in order to increase the level of individual participant's competence and professional knowledge to meet mission requirements. This comprehensive training and education of from four months to one year was provided in the following areas: National security with emphasis on management of natural resources under current and predicted environments as a supplement to the Executive Development Programs (4 participants); graduate level training in systems engineering and operations research occupations (5 participants); Congressional Fellowships to develop knowledge of organization and operation of Congress (1 participant); the Legislative Fellows developmental program to acquaint civilians with a working knowledge of the operations of Congress (2 participants); studies in management processes and methods at participating universities (2 participants); training at the Armed Forces Staff College to equip civilians to carry out their responsibilities within DoD (4 participants); and studies in management, science, and technology in various areas of specialized occupations in order to meet Navy objectives which is acquired on a continuing full-time basis at participating universities (Long-Term Civilian Training) (60 participants). A new program this fiscal year (FY 1981), the Secretary of the Navy Academic fellowship, provided graduate level studies in contracting, education specialist, management and personnel/equal employment opportunity management career fields (25 participants). Increased dollars are for Secretary of the Navy Academic fellowship program and inflation costs. Total participants 103.

Program Element: 88731N
DoD Mission Area: 471 - General Management Support

Title: Civilian Education Programs
Budget Activity: 6 - Defensewide Mission Support

2. (U) FY 1982 Program: Continued support is to be provided to various Naval activities of the ongoing programs in comprehensive training and education. The areas of training and participants remain the same as in FY 1981 for the first six areas and the Secretary of the Navy Academic fellowship programs since these are allotted spaces. The studies in the Long-Term Civilian Training program in management, science, and technology areas estimate 82 participants. A pilot program of the Secretary of the Navy Special Program for Civilian Personnel Management equal employment opportunity career fields is to begin this fiscal year with an allotment of 25 participants. Increased funds are for the pilot program and inflation. Total estimated participants for FY 1982 is 150.

3. (U) FY 1983 Planned Program: Continued support is to be provided to various Naval activities of the ongoing programs in comprehensive training and education in all areas covered in FY 1981 and FY 1982. Increased costs in this fiscal year will be to provide additional support for management development training and participation in the Senior Executive Service training which will be part of the Long-Term Civilian Training programs in management, science, and technology areas with an estimated total participation of 111 in this program. Increased funds are for the addition of the Senior Executives participation in FY 1983 is 179.

4. (U) FY 1984 Planned Program: Continue to provide support for a comprehensive training and education program to various Naval activities of the ongoing programs and additional programs that have been added in previous fiscal years. Increases in funds are inflation costs and additional participants in the Long-Term Civilian Training program in the management, science, and technology areas for a total estimated participation of 123. All other programs remain the same within their allotted spaces. Total estimated participants for FY 1984 is 191.

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

6. (U) Milestones: Not applicable.